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ENTERED AT POST OFFICE, NEW YORK, AS SECOND CLASS MATTER.

New Shafting Lathe.

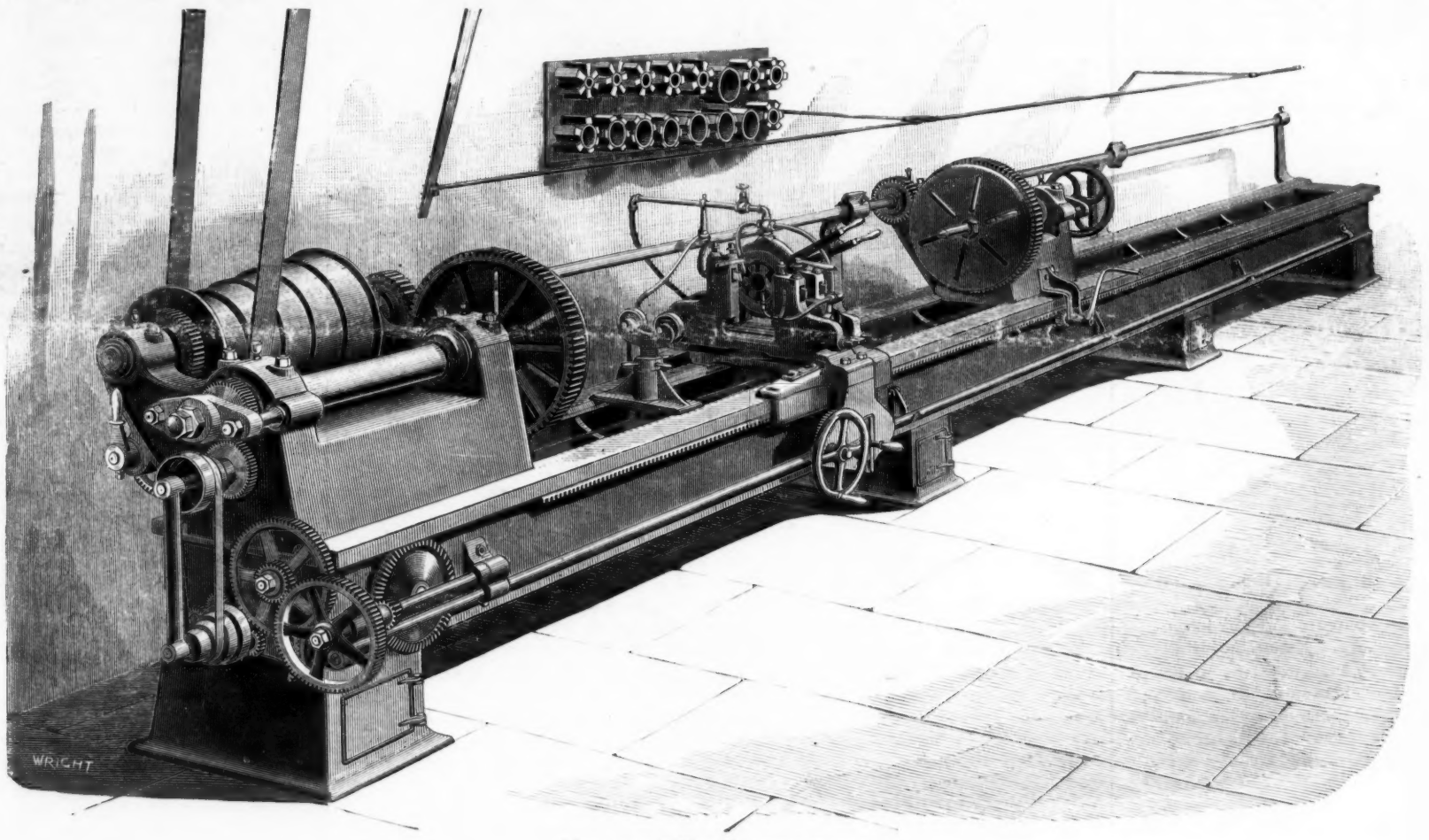
This lathe was designed by W. J. Muncaster for turning shafting. It consists of a heavy bed, closed at the bottom, forming a trough, and provided with suitable outlets for draining the water. On this bed are placed two driving heads, one of which is movable similar to the tail stock of a lathe. Secured to the spindle of each head is a face plate, provided with openings for engaging the drivers. The two face plates are simultaneously driven by pinions on a shaft supported on the back of lathe by hinged brackets. This shaft is driven by a five-step cone, and is also back-geared, giving ten changes of speed.

The carriage is fitted with a revolving head carrying the tools and steady rest. The tools are all adjusted on the front side, either way. The head is turned by means of the spindles which pass through and are provided with squares for the wrench.

The bush for holding the shaft is adjusted by means of a split conical ring, and can be opened or closed by the levers shown. A flexible pipe from a hydrant, or other supply, having its end secured to the carriage, and moving with it, enables the water to be forced through the small nozzles so placed that they direct the water to the cutting edge of the tools under the chip, taking away instantly, any heat generated and keeping the tools perfectly cold when cutting at a high rate of speed; at 60 feet per minute they are said to remain perfectly cold. The object of revolving the tools, is to save the time in running the carriage back.

The counter-shaft is provided with a cross-belt for reversing the motion. A hand wheel on the apron enables the carriage to be moved by hand; a handle is also provided for throwing the feed in or out. The feed for the carriage is a heavy steel wire rope securely fastened to it in the center, giving a direct pull. This rope is secured at both ends to a drum on which is coiled sufficient rope for the full travel of the carriage; as it plays out on one side it coils up on the other. At the end of the bed it passes over an adjustable sheave which takes up any slack, and returns under the bed. This rope gives a remarkable strong and steady feed, the elasticity of the rope not being excited by a heavy cut. Elevating rests are provided with rollers for sustaining long shafts while being turned. The centers are made sufficiently long to pass through the bushing and enable the tools to pass entirely over the shaft.

For driving the shaft a dog is used having two projecting arms that extend to the face plate. This dog is hinged so that it can be removed from one end of the shaft and secured to the other, without taking the shaft from the centers, and in order to allow the tools to pass entirely over the shaft. Both face plates revolving with the shaft prevent any grinding of centers; a long slender shaft can be driven at both ends at the same time. The usual speed for this lathe on 2″ shafting is 120 revolutions per minute. It is built by Muncaster & McKaig, Cumberland, Md.



MUNCASTER'S NEW SHAFTING LATHE.

The five-cent Sunday fare on N.Y. elevated railways is likely to be abandoned, the managers claiming that it does not pay.

Early Engineering Reminiscences.

BY GEORGE ESCOL SELLERS.

EIGHTEENTH PAPER.

The Chicago National Exposition of Railway Appliances in 1883 possessed great interest by the accumulation of early instructive railroad appliances, as land marks in the progress not only of railway construction, but in all machinery pertaining thereto, particularly in the advance to the present perfection of both freight and passenger cars and to the distinctive American locomotive. At the same time to persons not familiar with the changes and alterations made from time to time in machinery as it is continued in use, and who are not able to detect or discover these changes, an exposition without note of the changed parts gives a false impression as to progress, and thus errors creep into and become fixed in history. I will cite an instance of this. An old and very interesting relic, a locomotive named Pioneer, No. 1, was on exhibition as the type of the Baldwin locomotive of 1836 with a certificate certifying that it was of that date, but no notice of any changes or alterations having been made.

This old engine, after its long and continued use, was still in fair running order. The driving wheels, half-crank axle, dome boiler and the inclined cylinders outside of the smoke box, the pump bodies as guides, were all the Baldwin engine of that period, but here all resemblance ceased, for the arrangement of the eccentrics and valve gear, so essential to the working of the engine, were not Baldwin's, either of that date or any subsequent date. On seeing this old relic, it called to mind an engine of the same character that I had seen in the Michigan Central Railroad shops at Detroit, that had the valve gear changed in the same manner by Mr. Stephen Newhall, master mechanic of that road. My elder brother was with me when looking at the old Pioneer, and I called his attention to these changes and asked if he knew anything of the M. C. engine? Before he replied, a man, whom I had noticed apparently critically examining the old engine, said to me:

"You are right, I worked for Newhall when this engine was altered. I took off the loose eccentrics, and if you will look under the foot-board you will see some of the old attachment for shifting them."

It did not occur to me until after we had left the engine and lost sight of the man, that Mr. Baldwin, before this engine was built, had abandoned his loose shifting eccentrics and had adopted a fixed single eccentric to each cylinder with double arm rock-shaft under the foot-board, the forward or backward motion being given by alternately attaching the eccentric-rods to either upper or lower arm of the rock-shaft by flat hook connections, the arms of the rock-shaft being brought into position to connect by hand levers.

I have no recollection of the loose reversible eccentric on any of Mr. Baldwin's engines after his first engine, built for the Philadelphia and Germantown Railroad; at all events the Lancaster, built for the State road, and I think the third of his build was, as I have described above, single fast eccentrics

and double arm rock-shaft. I have good reason to remember this. In the fall of 1834, about the time we had undertaken to built engines for the State road, I was called to Lancaster to advise with the canal commissioners. Mr. John Brandt being there, asked me to ride with him on the Lancaster with a freight train, as far as to where it would side track to allow the passenger train to pass, and then to take it to the city; but it was ordered otherwise, for we had not gone over fourteen or fifteen miles with the Lancaster, before it, with the train, came to a standstill. We were on the foot-board at the time, and Brandt held the throttle lever. The cause of the stop was soon evident. The center loose spindle of the hand lever rock-shaft was placed back of the dome of the boiler above the fire-door; this spindle extended into a hollow portion of the rock-shaft some 10″ or 12″, and was lubricated through several small holes drilled in the upper side of the rock-shaft. This spindle had become fastened in its socket, causing the breaking of one eccentric-rod and the bending of the other.

Brandt at once commenced taking off the rock-shaft, saying if he could get the spindle loose, he thought he could run the engine and train to the side track that was not over a mile ahead, working the valves by the hand levers. Considerable time was lost in the effort to loosen the spindle and get the rock-shaft apart by heating the hollow portion and cooling the spindle end, but with the appliances at hand it resisted all efforts. The nearest blacksmith shop was on a country road over a mile away. A flag-man was sent back to stop the passenger train, with directions to cut its engine loose from the train, and push the disabled engine and train to the side track. This arranged, the fire was drawn from the Lancaster.

Mr. Brandt, myself and two others started for the blacksmith shop, each carrying his portion. Our course was over fences, and across fields. On rising ground, in full sight of the railroad and not over a quarter of a mile from it, we came to a farm house, at which a hog-killing frolic was going on. Brandt was acquainted with the German farmer, who offered to hitch up his team and take us to the smithshop. He said he had some tools in a little repair shop, that Brandt was welcome to the use of—a good strong vise, blacksmith's bellows, anvil and tools, but no coal. "If the bellows and hearth are in order," said Brandt, "I can straighten these rods and make the weld with brands from under the hog-scalding kettle," which was then in full blast. It was not long before he was at work with great earnestness. My portion of the job was to loosen the spindle, by stretching the outer shell of the rock-shaft with a hand hammer. A pretty long and tiresome job, but successful. When the spindle was got out, it did not show signs of either heating or cutting, it was simply dry blue cemented for about four inches of its length between the oil holes, which seemed to have been stopped by a thin scale in contact with the spindle, a case of dry sticking, such as is often experienced with ground glass bottle-stoppers; the original fit had been a little too nice to admit the oil. From our elevated position we saw the four-wheel English locomotive cut loose from its train of a four-wheel box baggage car and five four-wheel passenger cars, that could seat twenty-six passengers each. For over an hour the English engine was puffing away in a vain effort to push the Lancaster and train to the siding. She could start the train back on a down grade, slack the connecting links and bump the cars together again; but as to going ahead, it was the old story of one step forward and two back. The accident happened about 4 P.M. on a short fall day; it was long after dark when the repairs were completed. Brandt, with the brands from the hog-scalding fire, with poor tools and improvised helpers, had made a good weld. It was near eight o'clock when the engine started in good running order.

While these repairs were going on in the little workshop or stable lean-to, the farmer's wife was not backward with her true German hospitality, for she came with a jug of pure water and a square quart bottle of home-made bitters, pressing it on us with the assurance that "she is nice, she is goot." The daughters and guests at the lard rendering and sausage making, came with coffee, hot corn-cakes, and other nice things, which we ate standing without stopping our work, using the hands of the fair ones to put the food in our mouths in a manner that caused much merriment and many Pennsylvania Dutch jokes.

The passenger engine with its train, felt its way to the city, with a couple of common lanterns hung on the front bumpers, for it was before the day of cow-catchers, now called pilots, or headl-ights. This was railroading fifty-one years ago, on what is now the great Pennsylvania Central.

With this experience, my recollection of the valve gear of that period on the Baldwin engine is clear, and I expected to find the same on the Pioneer, No. I, then on exhibition. I kept a look out for the man who spoke of having taken off the loose eccentrics, but failed to find him, which I regret, thinking it possible that Mr. Baldwin might have so improved his loose eccentrics as to have again built an engine with them, I was anxious to trace this old engine.

When I commenced writing these reminis cences to guard against errors of memory, knowing that my nephew, Morris Sellers, now of Chicago, had been on the Michigan Central, while Mr. Newhall was superintendent of motive power, I wrote asking if he had any recollection of the alterations made on the valve-gear of a Baldwin engine on

ACCIDENTS RESULTING FROM FAULTY PRACTICE. [See page 3]

that road, and if he could give me anything in regard to the early history of the Pioneer. With his reply he forwarded for my perusal (to be returned) a letter from the Baldwin works, in reply to inquiries of Mr. Geo. W. Felton, Superintendent of the Chicago and Northwest Railroad, as to the history of the old Pioneer, owned and in use by that company. They say:

"By referring to the order books, which contain the records of the locomotives built by us from 1836 to 1850, we are unable to identify this engine under the name given. Some years ago our Dr. Williams had occasion to investigate the history of the engine referred to. Inquiries concerning it having been directed to us at that time by Mr. John C. Gault, then with the Chicago, Milwaukee and St. Paul Railroad Company, his recollection is that the facts then developed showed the locomotive to have been built originally for the Utica and Schenectady Railroad in 1836; it was the 37th locomotive built by Baldwin, the founder of these works, and was tried on the 14th of July of that year."

My nephew in his letter says: "The present management have little information as to when the Pioneer came on their line. In January, 1855, I went to work on the Michigan Central Railroad, Mr. Stephen Newhall, then superintendent of machinery, sent me to Michigan City, and the first job I did was to set the valves on the engine Swallow, a *fac-simile* of the engine Pioneer, with exactly the same motion shown on her at the exposition; the Michigan Central Railroad had two of these engines, the second being the Alert. This engine, at the time I name, was in the back shop at Detroit, being thoroughly overhauled, and, if my memory serves me, having her *loose eccentric* removed for the hook motion I found on the Swallow." At a later period, when he was running a gravel train at Chicago he says: "I remember the Alert came to Chicago, and was sent over the river to some western road, and as the old Galena road was the only road coming into Chicago on the north side, it must have been to that line, which is now the Chicago and Northwest Railroad.

The inference is that the name Alert was changed to Pioneer No. 1, being probably the first construction engine on the railroad. Further on my nephew says: "I am very certain that Mr. Newhall changed the motion of both these engines. Mr. Charles F. Jauriet, some time before his death, in speaking of these old engines, said he ran the Swallow on passenger trains, and that both engines came from York State, I presume Schenectady Railroad, although it is quite likely they were directly from Baldwin, as the road was running as early as 1838, at which time he was building engines of that class."

James Elkins, an old locomotive engineer, who has been with me many years, tells me that during the years 1847 and '48 he ran a Hinde & Drury engine on the Michigan Central Railroad; at that time Daniel Petty was master mechanic. That the road, when it belonged to the State and before its sale to the Eastern Company, was equipped with the Baldwin engines, all of the six-wheel type, with *single eccentrics*; he has no recollection of any of them having the loose reversible eccentrics; this was before Mr. Newhall took charge; that all these first locomotives were then in efficient and active service.

The Pioneer was a most interesting relic to me; the only regret being that the alterations that had been made on it, had not been noted when put on exhibition as a type of engines of 1836.

Here, at the Bowlesville coal mines, in southern Illinois, is another relic, a link in the progress of locomotives. It is a six-wheel Baldwin engine, one pair of 4½-foot drivers and four-wheel truck. There is neither number nor date on this engine. It was purchased by the coal company of the Camden & Amboy Railroad about 1855 or '56. It was represented as having been built in 1840, and at the time of its sale was thoroughly overhauled before shipping; with it was also purchased an old English locomotive that has long since gone with old scrap metal. In 1870 I put new fire-box and flues in the old Baldwin engine, with such alterations as to adapt it to burn soft coal, it having previously been used with wood. After these changes the engine continued in regular service for about five years, and then occasionally until 1880, when the outer shell of the boiler was found to be unsafe, though all the working parts were in fair order. It was thrown out to the weather and gradually dismantled, as portions could be used in general repairs. Its actual active service may be fairly estimated as over 35 years.

This old engine has the dome boiler, an iron frame of the simplest construction, straight flat bars of 1⅜″x4″ extending from back to front bumper, the jaw pedestals for the driving axle, cast iron bolted to these bars; the *driving* wheels are fornt of the fire-box, the same position as the Norris engine of 1834. They are outside connected, no outer frame, but in its place a rim-board from the cab to the front bumper, with hold on hand-rails lengthways on top of the boiler, that the fireman could safely clamber along and lubricate while the engine was running; cylinders 10½″x10″ stroke. The barrel of the pump make a single guide-bar, a device peculiar to all the early Baldwin engines; the driving wheels are cast iron with both spokes and rims double flanged, with hubs apparently over 2′ diameter into which the wrist pins are secured; but these hubs are hollow and internally arranged to *counterbalance* the crank portion; they are closed by a heavy iron plate securely bolted and riveted. The single eccentrics have given place to two eccentrics to each cylinder; the flat hook connection to the rock-shafts still used, with hand lever socket-spindle rock-shaft back of the dome and over the fire door, that the runner could throw the rock-shaft arms in position, secure connection.

Our struggle with the Pennsylvania Canal Commissioners to allow us to build for the State Railroad outside-connected engines, with iron frames, was in the fall and winter of 1834, the first engine being put on the railroad in 1835.

The history of the Baldwin Locomotive Works, from 1831 to 1881, on the 17th page, we find:

"On the one hundred and thirty-sixth locomotive, completed October 18, 1839, for the Philadelphia, Germantown and Norristown Railroad, the old pattern of *wooden frame* was abandoned, and no outside frame whatever was employed; the machinery, as well as truck and pedestals of the driving-axles being attached directly to the naked boiler. The wooden frame thenceforward disappeared gradually, and an *iron frame* took its place." In the same year it was noted that he was building outside connected engines, "and had succeeded in making them strong and durable."

This is an evidence of the slow and guarded advance. It took four years of continuous service of *outside connected iron frame locomotives* on the State road before this justly celebrated builder adopted them, and now his biographer tells it in language from which any one would infer that it was original with him.

The truck of this old relic is most ingenious; it comes as near as possible to accomplishing what was done by the center carrying truck that I have before described as possible, without adopting it. It may be said to have no frame, the axle boxes are firm without any play, being fixed to the bar that connects that of the front to the back axle; between these boxes, on the upper side of this bar, there is raised a massive cast iron boss or lobe, faced on both sides, through which is a transverse hole of about 3″ diameter; in front of this is a vertical hole that passes through the connecting bar, of about 2″ diameter; the plate springs are hung under and between the axle boxes, a rod or plunger passes through the vertical holes, the lower ends resting on the center of the springs, the upper end being considerably enlarged and slightly rounded against the under side of the engine frame thus transmitting the weight of the front end of the engine on to the springs. The side boxes are connected, one pair with the other, by a shaft with deep collars that fit against the bosses and are drawn tight by keys on the ends that pass through the transverse holes; the center of this shaft is so shaped that the center pin of the engine passes through it and is free to play up or down, the stability of the truck depending on this shaft and the deep flanges on the wheel axles.

The tenders that came with these engines were alike for both the Baldwin and the English engine, and no doubt were specially constructed for service on the Camden & Amboy road, where the fuel used was Jersey yellow pine or Carolina pine knots, that, at that time, came to Philadelphia by the vessel load for locomotive fuel. The sparks set fire to the wood in open tenders. These box tenders have eight wheels very closely coupled, with brakes to all the wheels. The wooden frames or platforms are 18′ long by 8′ 4″ wide; on this is a box car 13′ long with rather flat double pitch roof covered with tin. The round iron water-tanks stand in this car; they are 4′ diameter by 5′ 6″ high, the water taken through a sliding door on the roof. The wood for fuel was stored within the car-box out of danger of sparks. There was a sulky seat on top of

these tenders, with gig top cover and ample aprons as protection to the guard. No doubt there are many persons, now living, who can recollect the appearance of the trains as they left or came into the Camden depot with their trains of short 4-wheel passenger coaches with the guard mounted on his high perch. I have an impression that Mr. Stephens was the originator of these safety tenders, for they are provided with a draught arrangement, of his contrivance that he valued highly, a continuous draw-bar, with spring arrangement, that relieved the car platform or frame of all strain.

Accidents Resulting from Faulty Practice.

(From *The Locomotive*, published by the Hartford Boiler Insurance Company.)

Our illustration this month (see cut, page 2) shows the results which may follow the use of very good feed-water when a wrong course of practice is followed in the management of the boilers.

The plate shown in the engraving was cut from one of five new boilers which all burned and bagged as shown inside of three weeks after they were first started up. The water used was of very good quality, making but little scale or sediment, and the accidents were due entirely to the manner in which the fires were managed. The burns all occurred within a few inches of the front heads of the boilers, and all occurred at the same hour of the day, although on different days.

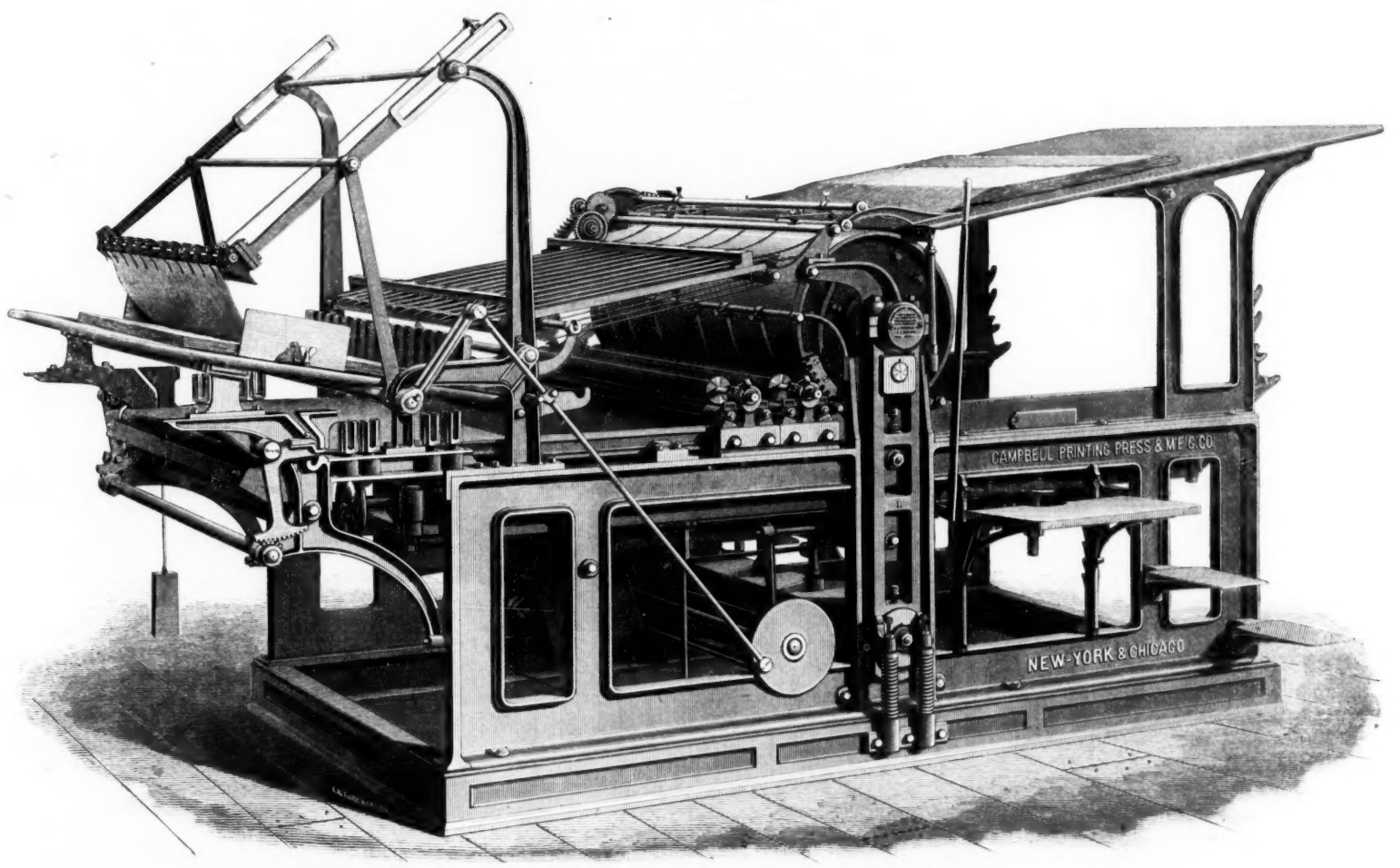
It was customary to bank the fires at noon, or rather to fill the furnace full of soft coal, and leave the fire doors open, instead of closing the damper partially, to check the formation of steam. This allowed a current of cold air to enter above the fuel and impinge on the fire sheet. This, of course, would check the circulation, and what little sediment the water held in suspension, and which would circulate with the water as long as steam was being rapidly generated, would naturally be deposited on the bottom of the boiler near the front end.

Upon starting the works at one o'clock, it was the practice to run a slice bar through the thick layer of coal put on an hour or so before, and which had in the meantime become thoroughly coked, and break it up thoroughly, then close the fire door. This intense heat thus suddenly applied to the boiler burned the sediment on to the fire sheets before a brisk circulation of the water could be established, which would have gradually picked it up and prevented any damage. But after it was once baked on the shell it could not be removed by the circulating water, and the overheating, bagging, and burning of the iron followed naturally in a short time.

The bag or pocket shown in the illustration is about four inches deep, fifteen inches broad at the base, and at the lowest point the iron is thoroughly burned out. The thickness of the layer of sediment on the interior is but about one-sixteenth of an inch. Upon careful examination by our inspector, a change in practice was made, and no further trouble has occurred for several years.

Another similar case occurred at about the same time in another locality, where, in a battery of fourteen boilers, three of them "came down" at once. This latter case was due to the peculiar method of "banking" the fires, and was stopped, as was the first one, by a change in practice.

Too much care cannot be exercised in cases similar to the above in the method of firing the boilers. Fires should be started and steam raised gradually, that circulation may be established in a proper manner. This will not only prevent such accidents as have been described, but will also prevent undue strains on different portions of the shells, due to differences of temperature. Many boilers have undoubtedly been ruined by injudicious firing, and the fault attributed to some defect in the boiler, when in reality none existed.



NEW SHEET DELIVERY FOR TWO-REVOLUTION CYLINDER PRINTING PRESS.

New Sheet Delivery for Two-Revolution Cylinder Printing Press.

The Campbell Printing Press and Manufacturing Company, of No. 160 William street, New York, and 306 Dearborn street, Chicago, Ill., have recently introduced a novel method of sheet-delivery on their well known two-revolution cylinder press, which is shown in the accompanying cut. Since 1867, when they first introduced the two-revolution press, the company have constructed this type of machine to deliver the sheet from the top and front of the cylinder upon a series of inclined fly-fingers, which, as soon as the sheet was wholly received upon them, oscillated through an arc of some 120 degrees, depositing the sheet with the freshly printed side downward, the unprinted side of the sheet, however, alone coming in contact with the fly-fingers, thus insuring freedom from smutting or marring the work during the delivery.

Until quite recently the delivery of the sheet without contact of the freshly printed side with any part of the mechanism was peculiar to their machines; and the mere turning over of the sheet upon the receiving board was not considered any serious detriment to the printer. Lately, however, various devices have been instituted among press builders, looking not only to the clean delivery of the sheets, but also to the laying of them face up upon a receiving board; printers also have latterly been disposed to place greater importance on the latter feature than heretofore.

To meet and conform to this preference, the modification of their original delivery shown in the cut has been devised, in which the sheet is laid face up upon the board with as perfect freedom from contact of the freshly printed side of the sheet with any part of the mechanism as in their older method.

In the novel device shown in the cut, as in their original device, the sheet is received from the top of the cylinder, during its non-printing revolution, upon a series of fingers and intervening tapes, which are run at the same surface velocity as the cylinder, with the unprinted side of the sheet in contact with them, and passing down them at the surface velocity of the cylinder. Upon the arrival of the sheet wholly upon these tapes and fingers, instead of being oscillated through an arc and laid face downward upon the board by the fingers, the fingers remain at rest, and the leading edge of the sheet is met by a series of reciprocating grippers, which are plainly seen on the under side of the sheet in the cut. They are not opened for its reception, but lie in contact with a continuous upper jaw, in such a way as to present to the advancing edge of the sheet an extremely acute angled opening formed between the grippers and the upper jaw; the sheet, by its own momentum, wedging itself into this opening, so as to be firmly held without any appreciable width of margin being clamped between the grippers and the jaw. The grippers are given reciprocating travel nearly parallel with the receiving board by means of a system of levers, as shown, similar in operation to the well-known parallel motion—from which the manufacturers have named the device the "Parallel-Motion Delivery"—and the grippers are opened for the release of the sheet at the end of their outward excursion, by means of a small rod sliding in a bearing at its upper end secured to one of the slotted levers. This rod at its lower end is articulated to a short arm which is keyed on the gripper rock-shaft. The upper end of the rod is bent to engage a pin projecting from the collar on the upper fulcrum rod, upon which the gripper-carrying levers oscillate and slide, so that the sliding motion of the lever on this rod automatically opens the grippers at the same time the sheet has reached the position at which it is to be dropped upon the board. The fingers which receive the sheet from the cylinder are automatically moved slightly to and from the cylinder, to allow, at the proper times, the sheet to pass down to be printed, and to pass on top of the fingers at the succeeding revolution of the cylinder to be delivered. This is accomplished by having the lower ends of the fingers attached to a bar extending from two arms, which are keyed to a rock-shaft oscillating the lower part of the uprights. On the outside of one of the uprights an arm is keyed upon this rock-shaft, which is engaged alternately by dogs attached to the connecting-rod that imparts the motion to the gripper-carrying levers.

The sheet being wedged tightly by its leading edge into the acute angle of the grippers, is assisted in running off by the tapes, which also serve to carry it down to and into the grippers. Over the tapes, but allowing a space of about an inch between them and the tapes, are a series of metal guides for the purpose of preventing the leading edge of the sheet being turned up by accidental currents of air, and thus be prevented from entering the angle of the grippers; but these will, in no case, ever touch the printed or upper face of the sheet while running down upon the tapes.

In this way the sheets are delivered without the possibility of smutting, and placed, printed side up, upon the board, and with the least possible gripper hold upon the sheet. It will be observed that, in this arrangement, the reciprocating travel of the grippers is required to be but slightly greater than the length of a maximum sheet, and that they have the entire time occupied by a complete evolution of the machine—*i. e.*, during two revolutions of the cylinder—within which to make their double excursion; from which construction the sheet has to be moved merely its own length by them during one-half that time. This feature admits, in this device, of delivering the sheet at very high speeds, particularly as the termination of the sheet's outward motion, as held by the grippers, is a gradually retarded one, as imparted by the crank disk which gives motion to the gripper-arms.

This improvement is the invention of John T. Hawkins, the Company's president and mechanician. A number of them are already in successful operation in different parts of the country.

Mending and Putting on Belts.

BY JAMES F. HOBART.

Putting on an engine belt is one of the things which Mr. Oberlin Smith should have included in his article on the "Sinfulness of Shafting."

We used to have a 30-inch rubber belt, which gave us more trouble than a whole mill ought to give. This belt was 125 feet long, and ran under a 42-inch binder, about 12 feet from the crank-shaft.

No lacing would stand in that belt. Hooks were "n. g.", and rivets pulled out.

The belt was "six-ply." We put the belt on again, and made a cement joint. It staid there as long as we knew the place.

Eight inches from the end of the belt, we cut across, taking care to work square. We cut down all the thicknesses but the last, and split off a piece 5 plies thick, and 8 inches long. Next, we cut back 8 inches further, and took off 4-ply deep, leaving 2. The next cut took off 3-ply, the next 2, and the last 1. We then had the belt cut off in a series of steps, 5 in number, and 8 inches long, each.

When the belt broke the last time, it made itself too short, and a piece had to be put in. It was cut by the above method, and fitted the end of the belt exactly.

A bottle of naphtha was procured, and the whole splice thoroughly rubbed with its contents. At the same time, the splice was carefully scraped, and all half-detached pieces of rubber carefully taken off. The naphtha "killed" all the grease and smoothed the surface of the rubber.

Rubber cement was rubbed all over the surface of both pieces of the splice. By means of a pad of cotton cloth the cement was spread evenly, and, necessarily, very quickly

It dried very quickly, and a second coat was applied. As quick as the second coat "set," so that the fingers would not stick to it, the two pieces of belt were laid together upon a hard floor, on smooth iron (I used the engine pulley), and lightly hammered with a large-faced hammer, which had been ground rather "rounding."

The cement will "bite" as quick as it comes together, and the hammering must be done quickly. After hammering, I punched two rows of holes across the edges of each lap, and 2½ inches apart, and along both edges. Small copper rivets were put in and riveted *very lightly*. Don't over-rivet them; they are worse than useless if so done, and soon cut the belt.

The belt must be cut to length, and the second splice cut after clamping up. The easiest way to get a heavy belt together, so the clamp-rods can work, is to use a pair of blocks or differential chain falls. Get a second pair of clamps and put them on behind the screw-clamps. Now put a rope sling around the ends of each outside clamp, hitch on the falls and draw up the belt. Take care that the rope does not draw against the belt. We once saw this same belt cut half off by the rope around the back clamp. When drawn up so the clamp-screws will reach, the falls may be taken off and the belt drawn up by the screws.

Make the splice as the first was made. Instead of hammering on the pulley, we must have a hard-wood board, or a piece of boiler iron to work on. Slip it under the belt, and let it lie on the clamp-screws while hammering and riveting the splice.

"Gandy" belts may be put together in the same manner. Use much naphtha to kill the oil in which they have been soaked, or the splice will not hold.

For leather belts the common scarf lap-splice will do, using one part fish to two parts common glue.

Warden Lanehart, of Auburn Prison, after trying the State account system of manufacturing shoes, says he is convinced the system is better for the workingmen than the contract system, as he has sold the product at regular market prices. True it is an improvement over the contract system, as the State gets the profit, but the convicts should be kept at work on something required by the State. Let them work on the public roads, the canals and other public property.

Beware of so-called "low-water alarms" that are inside the boiler, or that must be relied upon exclusively.

If you want an attachment of this kind attached to your boiler, put it outside where it can do no harm if it fails to do good.

Are you intending to heat your shop with exhaust steam? How would it work to put an air heater in the engine room, and drive the hot air wherever you wish?

The great trouble with the hydraulic ram, is in keeping air in the air chamber. The air soon sucks out and the chamber becomes completely filled with water.

To cure the trouble, drill a small hole in the feed pipe, close to the air chamber. Get this hole too large, and the ram will not work. A hole .01" or .02" is large enough. Drill a .0625" hole, and caulk down to the requisite size. This "pin hole" admits a supply of air to the chamber.

The free traders are greatly troubled about the growth of manufacturing in this country and the increase of wealth thereby produced. One of them read a paper at the Chicago Convention, in which he said: "Twenty-five years ago farmers owned half the wealth of the country. To-day they own but one-quarter. Their influence in making laws and in all public affairs is waning as rapidly as their wealth."

As most of the manufacturing industries of this country have been built up within twenty-five years, under a protective tariff, the relative portion of wealth held by farmers necessarily changed. But the actual wealth owned by farmers has greatly increased during that period. The free traders would suppress manufacturing and make this a nation of farmers, as it was twenty-five years ago. The influence of farmers in making laws has not waned. When they use their influence collectively they get such laws enacted as they want. Those States most exclusively devoted to farming elect mostly protectionists to Congress.

Modern Locomotive Construction.

BY J. G. A. MEYER.

FIFTEENTH PAPER.

INSIDE LAP, CLEARANCE AND INSIDE LEAD.

Now, a few words in regard to some other terms used in connection with the slide-valve.

Inside Lap.—The amount that the inside edges i and i_2 of the valve, Fig. 65, overlap the inside edges s and s_2 of the steam ports, when the valve stands midway of its travel, is called inside lap; thus, the distance from s to i, or from s_2 to i_2, represents the inside lap. Its purpose is to delay the release of steam.

The amount of inside lap is comparatively small, rarely exceeding $\frac{1}{8}$ of an inch, and in a number of locomotives the valves have no inside lap. Rules for determining the inside lap cannot be given, because engineers do not agree on this subject. The writer believes that for slow-running locomotives, particularly if these have to run over steep grades, a little inside lap will be beneficial. For ordinary passenger locomotives running on comparatively level roads no inside lap should be used.

Inside Clearance.—When the valve stands midway of its travel, as shown in Fig. 66, and its inside edges i and i_2 do not cover the steam ports, then the amount by which each edge of the valve comes short of the inner edges of the steam ports is called inside clearance; thus, the distance from i to s, or from i_2 to s_2, represents inside clearance. The purpose of inside clearance is to hasten the release, and is sometimes adopted in very fast-running locomotives. It seldom exceeds $\frac{1}{64}$ of an inch. Good judgment and great experience are required for determining the amount of clearance, and for deciding for what classes of locomotives it should be used. In ordinary passenger locomotives the valves have no inside clearance.

The width of opening of the steam port for the release of steam at the beginning of the stroke is called inside lead; thus, when the piston is at the beginning of its stroke, and the valve occupying the position as shown in Fig. 67, then the distance between the inner edges i_2 of the valve and the inner edge s_2 of the steam port is called inside lead. The simple terms "lead" and "lap" are used among engineers to designate outside lead and lap; hence, the necessity of using the terms "inside lead" and "inside lap" when such is meant.

THE EVENTS OF THE DISTRIBUTION OF STEAM.

In the distribution of steam during one revolution of the crank, four distinct events occur, namely:

1st. The admission of steam.

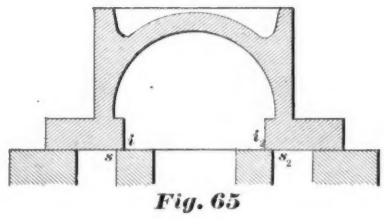


Fig. 65

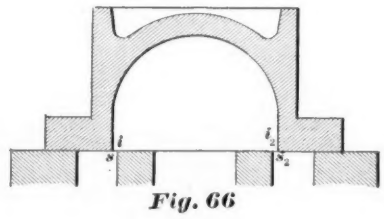


Fig. 66

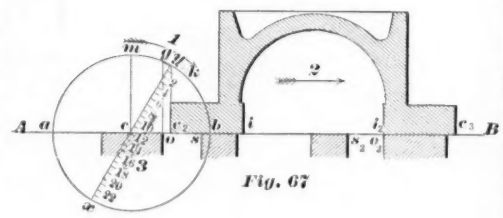


Fig. 67

2d. The cutting off, or, in other words, the suppression of steam.

3d. The release of steam.

4th. The compression of steam.

The outside edges c_2 and c_3 of the valve, and the outside edges o and o_2 of the steam ports, will regulate the admission and suppression of steam; the inner edges i and i_2 of the valve and the inner edges s and s_2 of the steam ports control the release and compression of steam. The parts of the stroke of the piston during which these events will happen can be found by the following methods:

Example 24.—Travel of valve, 5 inches; lap, 1 inch; lead, $\frac{1}{4}$ of an inch; stroke of piston, 24 inches; no inside lap or clearance. Find at what part of the stroke the admission, suppression, release and compression will take place.

In Figs. 67, 68 and 69 the valve occupies different positions, but the sections of the valve in these figures are exactly alike, because they represent one and the same valve. In Fig. 67 the distance between the edge c_2 of the valve and the edge o of the steam port is $\frac{1}{4}$ of an inch, which is the amount of lead given in our example; hence, this position of the valve indicates that the piston is at the beginning of its stroke. In Fig. 68 the edge c_2 of the valve and the edge o of the steam port coincide, and, since the valve is moving in the direction indicated by arrow 2, the suppression commences, or, in other words, the valve is cutting off steam when it is in the position as here shown. In Fig. 69 the inside edge i of the valve coincides with the inner edge s of the steam port, and, since the valve is moving in the direction indicated by arrow 2, the release must commence when the valve arrives in the position here shown.

In Figs. 67, 68 and 69 the distances from the outside edge o of the steam port to the center c of the circle $a\ b\ m$ are equal; that is, the points c and o are one inch apart, which is the amount of lap. The diameters of the circles $a\ b\ m$ are all five inches long, which is the travel of the valve given in the example, and the circumference of each circle represents the path of the eccentric, and also the path of the center of the crank-pin. The point y in these figures represents the position of the center of eccentric when the piston is at the beginning of its stroke. The distance between the point y and m is the same in all figures, and consequently the angles formed by the lines $y\ x$ and $A\ B$ are equal.

When the valve occupies the position as represented in Fig. 67, the center of crank-pin will be in the line $A\ B$, and since the piston will then be at the beginning of its stroke, it follows that the line $A\ B$ will indicate the direction in which the piston must move. In order to compare the relative position of the piston with that of the valve with as little labor as possible we shall assume that the direction in which the piston moves is represented by the line $y\ x$, instead of the line $A\ B$; hence the point y will not only show the position of the center of the eccentric, but it will also indicate the position of the center of the crank-pin when the piston is at the commencement of its stroke. If these remarks are thoroughly understood, there will be no difficulty in comprehending that which is to follow.

Now let us trace the motions of the valve and piston and thus determine at what part of the stroke the events (previously named) will take place. When the piston is moving in the direction as indicated by the arrow marked 1, Fig. 67, the center of eccentric will move through part of the circumference, $a\ b\ m$, and the valve will travel in the direction indicated by the arrow 2, and thus opening the steam port wider and wider until the end b of the travel is reached; then the valve will commence to return, and as it moves towards the center c, the steam port gradually closes, until the valve reaches the position as shown in Fig. 68, then the steam port will be closed and steam cut off. To find the position of the piston when the valve is cutting off steam, we draw through the edge c_2 of the valve, Fig. 68, a straight line $c_2\ g$, perpendicular to $A\ B$, and intersecting the circumference $a\ b\ m$ in the point g; through this point draw a line perpendicular to $y\ x$ intersecting the latter in the point k, and this point k being 19⅛ inches from y indicates that the piston has traveled 19⅛ inches from the beginning of its stroke, before the steam is cut off, and that steam has been admitted into the cylinder during the time the piston traveled from y to k. As the piston continues to move towards the end x of the stroke the valve will move in the direction of the arrow 2, Fig. 68, and the steam port will remain closed so that no steam can enter the cylinder or escape from it, hence the steam that is now confined in the cylinder must push the piston ahead by its expansive force, but the moment that the valve reaches the position as shown in Fig. 69 the release of steam will commence. To find the corresponding position of piston we draw through the edge c_2 of the valve Fig. 69 a line $c_2\ g$, perpendicular to $A\ B$ intersecting the circumference $a\ b\ m$ in the point g. Through this point draw a line $g\ k$, perpendicular to $y\ x$, intersecting the latter in the point k, and this point k being 22⅜ inches from the beginning of the stroke indicates that the piston has traveled through this distance when the release of steam commences. Now notice, the steam is cut off when the piston has traveled 19⅛ inches, and the release of steam commences when the piston has traveled 22⅜ inches, consequently the steam is worked expansively during the time the piston moves 3¼ inches of its stroke. The steam port will remain open to the action of the exhaust during the time the piston completes its stroke and moves through a portion of its return stroke. In the mean

time the valve will move to the end a of the travel and return as indicated by arrow 4, and the moment that the valve again reaches the position shown in Fig. 69, the release of steam will be stopped. To find the corresponding position of the piston, draw through the edge c_2 of the valve Fig. 69 a straight line $c_2\ m$ perpendicular to $A\ B$ intersecting the circumference $a\ b\ m$ in point m. Through this point draw a straight line $m\ k_2$ perpendicular to $y\ x$, and intersecting th latter in the points k_2. Since the distance between the points x and k_2 is $22\frac{1}{4}$ inches, it follows, that the piston has moved through $22\frac{1}{4}$ inches of its return stroke, by the time that the release of steam will cease. As the valve continues its travel in the direction of arrow 4, Fig. 69, the steam port will remain closed until the edge c_2 of the valve coincides with the outer edge o of the steam port, and during this time, the steam which remained in the cylinder, is compressed, but as soon as the edge c_2 of the valve passes beyond the steam port edge o, the admission of steam into the cylinder will commence. To find the corresponding position of the piston, draw through the outer edge o of the steam port, Fig. 67, a straight line $o\ g$, perpendicular to $A\ B$ and intersecting the circumference $a\ b\ m$ in the point g; through this point draw a line $g\ k$ perpendicular to $y\ x$ intersecting the latter in the point k, and since the distance between the points x and k is $23\frac{7}{8}$ inches, we conclude that the piston has moved through $23\frac{7}{8}$ inches of its return stroke before the admission of steam will begin. Here we see that steam will be admitted into the cylinder before the return stroke of the piston is completed, and that is the object of lead, as has been stated before. Notice once more the compression of steam will commence when the piston has traveled $22\frac{1}{4}$ inches of its return stroke, and will cease when the piston has traveled $23\frac{7}{8}$ inches of its return stroke, hence the steam is compressed during the time that the piston travels through $1\frac{5}{8}$ inches.

In each one of these figures the point g represents the relative position of the center of eccentric to that of the valve shown in the figure. The point g will always be found in the circumference $a\ b\ m$, and in a straight line $c_2\ g$, drawn perpendicular to $A\ B$, and the former passing through the outer edge c_2 of the valve.

The reason why the point g should in all cases be found in the straight line $c_2\ g$ drawn through the outside edge c_2 of the valve, is this, when the center c of the circle $a\ b\ m$ is placed on the line $A\ B$ in such a position (and as has been done in these figures), so that the distance between the center c and the outside edge o of the steam port is equal to the lap, then the center g of the eccentric and the outer edge c_2 of the valve will always lie in the same straight line drawn perpendicular to $A\ B$. If the distance between center c and the outer edge o of the steam port is greater or less than the lap, then the center of the eccentric and outside edge of the valve will not lie in the same straight line drawn perpendicular to the line $A\ B$. Here, then, we can conceive the necessity of placing the center c of the circle $a\ b\ m$ in the position as shown in these figures. The correctness of these remarks must be evident to the reader if the explanations in the previous papers have been understood. Again, since we have assumed that the point g not only represents the center of the eccentric, but also the center of the crank-pin, it follows, that in order to determine how far the piston has moved from the beginning y of its stroke, when the crank-pin is at g we must draw a straight line through the point g, perper dicular to $y\ x$, as has been done in these figures.

From these constructions we can form our answer to Example 24, namely:

Steam will be cut off, or, in other words, suppression will commence when the piston has traveled $19\frac{1}{8}$ inches from the beginning of its stroke, and steam will be admitted into the cylinder during the time that the piston travels through this distance. The steam will be released when the piston has traveled $22\frac{3}{8}$ inches from the beginning of its stroke, consequently the steam will be worked expansively during the time the piston travels through $3\frac{1}{4}$ inches. The release of steam will continue until the compression commences, which will occur when the piston has traveled $22\frac{1}{4}$ inches of its return stroke. The compression will cease, and the admission of steam commence when the piston has traveled $23\frac{7}{8}$ inches of its return stroke.

The same answer to our example could have been obtained with less labor by a construction as shown in Fig. 70, which is nothing else but a combination of the three preceding figures; the methods of finding the different points in Fig. 70 have not been changed, and therefore an explanation in connection with this figure is unnecessary.

Don't abuse a globe valve. Screw down a rubber packed valve very hard and it will always leak. Just let the valve touch the seat—then stop turning. If the valve leaks, grind to a fit, or put in new packing, or both. *Never* try to tighten a leaky valve by main strength and stupidity.

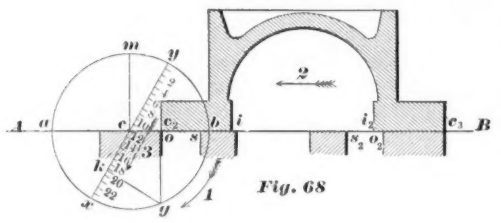


Fig. 68

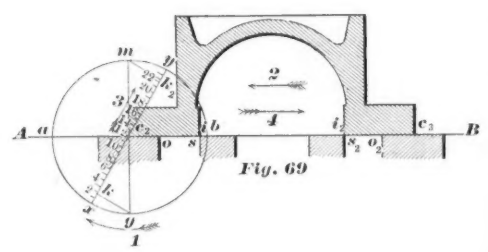


Fig. 69

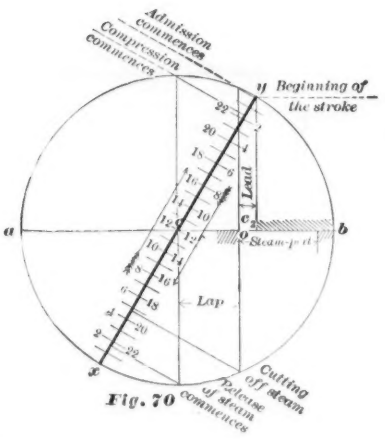


Fig. 70

The Frictional Resistance of Shafting in Engineering Establishments.

BY SAMUEL WEBBER, LAWRENCE, MASS.

A PAPER READ BEFORE THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

A paper on the above subject, recently presented to the Society of Mechanical Engineers,* seems to give an impression with regard to the amount of power actually consumed in overcoming said resistance, which differs widely from the results of the experiments of the writer of the present paper.

The reason for this discrepancy is to be found in the assumption made in the previous paper that indicator cards, taken with all the machine belts running on the loose pulleys of the machines, are a correct representation of the power absorbed by the shafting.

This is to be denied *in toto*, as the loose pulleys are only a part of the machine placed on it for the convenience of the operator, to avoid the delay and annoyance, and possible danger, of throwing the belt off and on the driving pulley on the shaft, every time that the machine is to be stopped and started again, and is in no sense a part of the shafting. When the machine is in operation the loose pulley is not in use, but the power is taken from the shaft to the machine by the machine belt, which latter is merely an accessory to the machine itself, which cannot be operated without it, while the shafting can be.

* Trans. Am. Soc. Mech. Eng., Vol. VI., p. 461.

The writer knows that this method of taking indicator cards to ascertain the power consumed by the shafting, with the belts running on the loose pulleys, has been the usual and common one, but it is none the less erroneous, as it only arises from the unwillingness of the mill owners or operatives to take the time and trouble necessary to throw the machine belts off for a few moments entirely while the indicator cards are being taken.

This amount of power consumed by the machine belts running on the loose pulleys, will average in a cotton mill fully 10 per cent., varying from 5 or 6 per cent. in the spinning-rooms to 18 or 20 per cent. in the weaving-room. This 10 per cent. is in this manner charged to the shafting, making an average as given in the paper referred to of 25 9 per cent. in a large number of mills for shafting and engine, which should not be over 16 per cent. in a properly shafted mill, and which is even much less than that in mills of modern construction, if the machine belts are thrown off before taking the indicator cards, a method of getting at the matter which has been accomplished by taking a Saturday afternoon for the purpose.

This 16 per cent. should be divided as follows: Engine, 6 per cent.; shafting and belting, 10 per cent., including in the latter all counter belts, and everything except the small belts actually driving the machines, to which their power, as has been said, should be charged, as they can neither be operated, nor their power weighed without them.

A number of years since the writer had occasion carefully to weigh and determine the power consumed in a large cotton mill, which had just been entirely rebuilt and fitted with new shafting by one of the most judicious engineers in New England, the late E. A. Straw, of Manchester, N. H., and although the shafting was not of quite so small a diameter or run at so high a speed as has since been often adopted, it was very well arranged, and would serve as at least a fair example of good average dimensions, and not much heavier than I should advise to-day, taking into account the necessary stiffness to resist *transverse* strain, when belts were liable to be led from it at any convenient point to reach the different machines, rather than limiting it to the diameter sufficient to bear the *torsional* strain only.

The summary of the total power required by the machinery was 744.22 horse-power, and in making up the account of the whole, 10 per cent. was allowed for the shafting, but subsequently the latter was calculated, as a whole, from weighings which I had made of a large part of it, assuming that which I had not weighed to require the same power in proportion to its diameter and velocity. These calculations gave a total of about 62 horse-power, or only 8.3 per cent., instead of 10 per cent., and have been fully confirmed by many subsequent experiments.

The spinning-room in this mill contained 198 throstle frames of 128 spindles each, requiring at least 1.5 horse-power each, or 297 horse-power in all, and 12 filling winders and 13 spoolers, requiring also 21.75 horse-power, or a total of 318.75 horse-power. These machines were placed in ten parallel rows, lengthwise of the mill, and were driven by two lines of main shafting, each driving a set of machines direct, and two other sets to either side by counter shafts, each of which drove two machines. This made twenty-four short counters driven from each shaft.

The main shafts were each as follows: One length of 10 feet 4 inches, $4\frac{1}{8}$ inches diameter, receiving the main belt; then divided equally to the right and left in lengths of 16 feet each, 80 feet of $2\frac{7}{8}$ inches diameter, 32 feet of $2\frac{5}{8}$ inches, 48 feet of $2\frac{3}{8}$ inches, and 32 feet of $2\frac{1}{8}$ inches; in all 202 feet 4 inches each. The countershafts were each 8 feet 6 inches long and $2\frac{1}{8}$ inches diameter, and the velocity of the whole was 216 revolutions per minute.

The required power to carry this shafting by dynamometer measurement was, for each main line, 1.587 horse-power, and the coefficient of friction was only .0334. For each set of four counters, with their counter belts, the power was .357 horse-power, and the coefficient of friction was .0413 The total power, therefore, for each system was,

main line	1.587 H.P
Six sets counters, four each @ .35,	2.142 "
or	3.729 H.P
which multiplied by two, gives	7.458 H.P

as the total for the room, or only 2.34 per cent. of the power required for the machinery.

Now this is the extreme light point, as the spinning room requires the least shafting, and uses the most power in the machinery of any room in a cotton mill. In a weaving-room for print cloths, the power for the shafting is about 20 per cent. of that required for the looms, or about the same as that absorbed by the machine belts running on the loose pulleys.

Having positively settled this fact in this mill, weighings were afterward made in other mills of a sufficient portion of the shafting to enable me very closely to compute the total, which I have only once or twice found to exceed 10 per cent., which basis I have therefore taken as a safe one to use in computations of the power required to operate a cotton mill.

As an illustration of the closeness of an estimate made on this basis, I was called upon some years since to decide upon the size of turbine required to replace an old-fashioned breast-wheel in a mill where every inch of water power was of value.

Dynamometer weighings gave me as the power required for the machinery ..... 214 24 H.P.
Adding 10 per cent. for the shafting, or ..... 21 42 H P.

gave a total of ..... 235.66 H.P.
as the horse-power required.

One of the sizes of the Swain turbine, which was the most economical wheel in the use of water which I then knew, was guaranteed to give 240 horse-power under the available head of eleven feet, and as this wheel had been very thoroughly tested by both Mr. Mills and Mr. Francis, I advised the mill owners to put in this size of wheel, though apparently a very close fit for the required power, for, as above said, every inch of water was of consequence. The wheel was put in, and to the great delight of the owners, when the water was let on, and the machinery put in full operation, there was still a part of the last tooth in the gate rack of eight teeth left unhoisted.

A similar operation, in another mill, a couple of years later, with the same turbine, gave equally satisfactory results.

At both of the last two mills spoken of, the shafting was old, and in excess of the amount which would be used to-day for the same machinery. Soon after making the first one of them, I was called upon to weigh the power used by one of the new mills at Fall River, which I did, and was told that my result did not agree with Mr. Bacon's cards from the indicator, of which I knew nothing until my test was completed. I said that I did not include the engine, for which at least 5 per cent. should be added.

Mr. Bacon's cards gave a total power, 470.57 horse-power; my weighings of the machinery only gave 408.94 horse-power, to which I had added 10 per cent. for shafting, making a total of 449 83 horse-power. This I then increased to 15 per cent. for "engine and shafting," making an addition of 20.45 horse-power more, and giving a total, 469 91 horse-power, or a variation of less than one-horse-power in the two results, with the estimate of 15 per cent. for the engine and shafting.

Indicator cards taken by me at one of the later mills in Fall River, when the machine belts were all thrown off from the driving pulleys on a Saturday afternoon, when it could be conveniently done, gave me only between 12 and 13 per cent. of the total for engine and shafting, and I am fully convinced, by these and other experiments, that 15 per cent. for "engine and shafting," or 10 per cent. for "shafting *only*," is an ample allowance to be made for a cotton mill in good running order, as they are now constructed.

While I thus dissent from the writer of the paper referred to, in regard to the data upon which it is based, I agree with him fully in the conclusions he draws in regard to undersized shafting and over-tight belts. Far more friction in the bearings will be caused by springing of a flexible shaft than would be due to the necessary excess of diameter to make it sufficiently rigid to resist flexure from the strain of the belts, nor is the substitution of steel for iron any material improvement in this respect.

From a series of elaborate experiments, made by Mr. Jas. B Francis, C. E., of Lowell, for the Merrimac Manufacturing Company, in 1866, and published by him in the *Journal of the Franklin Institute* for April, 1867, he deduces the fact that while a two-inch iron shaft, "subject to no transverse strain other than its own weight," would admit of a distance between bearings of 15 46 feet, a steel one would only admit of 15 89 feet, although the diameter necessary to resist torsion need be only 0 855 for steel to 1. for iron.

In my early recollections of mill shafting, over forty years since, cast-iron shafts, of a cruciform section, on which wooden drums or cylinders were built up, reaching from beam to beam, were still in use, although wrought-iron shafts and cast pulleys were being substituted. The first formula I remember, for the diameter of wrought-iron shafts, was given by Buchanan in his "Mill-work and Machinery," and was—

$$D = \sqrt[3]{\frac{100 \times H.P.}{R}}$$

This formula Mr. Francis still retained, after

the experiments referred to, as a good one for jack shafts, or first movers, and for the first length of lines, receiving the pull of the main belts, computing the factor of safety, or power of resistance above the breaking strain to be 15.58. For transmitting lines, he reduced this coefficient of 100 to 50, and for light countershafts supported close to the bearings to 33, and, since the introduction of "cold-rolled shafting," I have found the latter coefficient to answer perfectly for transmitting lines, although I prefer to keep close to the original formula for first movers, to resist the transverse strain without flexure, and when the bearings are from 8 to 10 feet apart, as is the usual condition in cotton and woolen mills, do not advise the use of any shafting much less than 2″ diameter, unless for the very last length of a line or for such light power as is required for knitting or sewing machines. Even in cases where the beams are 10 feet apart, it is well to use an intermediate hanger near the pulley, if any amount of power is to be taken off. I have seen a 2¼-inch shaft, at 250 revolutions per minute, where about 4 horse-power was taken from it midway between beams 10 feet apart, so "*buckled*" by the strain that I could not bear my hand on it near the pulley, and in other cases have found the coefficient of friction doubled in the same manner, when testing with the dynamometer.

While the above observations apply more particularly to cotton and woolen mills, still the same principle will hold good in all cases, and in the case of machine shops, where the percentage of shafting to the power consumed by the machine tools is much greater, the last countershafts, with their loose pulleys, are always sold with, and form a part of, the machine itself, and the power for these should be charged to the machine and not to the shafting.

DISCUSSION.

President Holloway said: "I suppose it is not common to have a great many countershafts. The point with some engineers will be whether, in arriving at the total amount of power lost in transmitting the power of the engine into the fabric, whether the power used to drive the countershafts, and all that is intermediate, may not be chargeable as a frictional resistance."

John T. Henthorn submitted a paper which was read by the secretary, in which he referred to his original paper on "The Frictional Resistance of Engine and Shafting in Mills," to which the paper of Mr. Webber was a reply. In this original paper was a table No. 1, giving "the percentage of full load required for engine and shafting in some 55 different mills." Exceptions, said he, are not taken, it seems, to the facts contained in table No. 1, column 16, collectively or relatively, but only upon the ground wherein the limit of the term shafting ends, and the resistance of machinery considered as a separate element commences. I consider that all of the resistance outside of the producing machine while such is not in operation are the elements to be considered and maintained; and whatever amount of resistance is due to the belts running upon loose pulleys should be, and is included, in my table, and should constitute part of the term shafting. If we are justified in omitting the belts and other loose pulleys on the score that they are a part of the machine, we may have equally good ground to eliminate all counters between main lines that are employed for driving one specific machine, and such counters as serve two or more machines would then come under the head of original shafting and chargeable to friction account.

Oberlin Smith called attention to the evil of too slow speed in machine shops. It did not exist so much in cotton mills, for there the diameters of pulleys and the relative speed of countershafts had been worked out; but in machine shops the main shafting had to run as slow as 100 or 150, when it ought not to run slower than 200, and 300 would be better. One great factor, said he, in this frictional resistance is the straining of belts. Of course, if we run the shafting slow and have to put on wide belts they suffer more strain than narrow belts. Another great advantage of narrow belts is the ease with which they may be shifted. I earnestly advocate the reform that line-shafting should be run a great deal faster, that machine-tool men should make their countershafts of larger diameter, and that belts should be run narrow and run quick.

George H. Babcock said that perhaps some one could tell the result of an experiment tried some years ago in Fall River, of making hollow shafting, and running it at such a high speed that the belts were taken directly from the shafting, and pulleys were dispensed with. Prof. Thurston told him that was done at Colt's armory. The tightening of belts, said Mr. Babcock, frequently leads to very serious losses from friction.

Oberlin Smith thought there was a middle ground in tightening belts, and said he believed the belts could be taken from the shafting without pulleys if the plan was carefully carried out. One trouble at Colt's armory was that their shafting was too heavy. The drums are cast iron, and must weigh enormously. The system is carried out by a system of steel tubes mounted on flange-ends.

Henry R. Towne said that the Wheeler & Wilson Company had their shafting belted without the intervention of pulleys. The shafting is of cast iron 12 inches in diameter. In fact the shaft is a 12-inch pulley. He thought that that system was only applicable, however, where the class of machinery employed in one room was pretty uniform.

Mr. Webber said he wanted it distinctly understood that he drew his line in shafting on the point of the loose pulleys. When, said he, the machine is running, the loose pulley is not, and, therefore, should not be deducted from the power of the machine to get the power of the shafting. I saw hollow shafting tried several years ago. They put it in and ran it until they broke so much shafting they took it out and put in wrought iron shafting. After running that a few years they decided it was economy to re-shaft the mill.

Substitutes for cross-head "brasses," made of apple-tree wood, were lately taken from a Philadelphia engine. They had been in use 11 years, and were replaced by similar ones.

"The Measuring Gauge," illustrated in AMERICAN MACHINIST, Oct. 24th, on page 7, is the subject of a patent now issued. Mr. D. G. Brown, 1419 South Fourth street, Philadelphia, Pa., is the patentee owner.

"Anchor ice" will soon begin to trouble water-wheels. So much of it, as is near the surface of the water, may be eliminated by putting a wooden grate or lattice work, in the race way or canal just above the racks.

The grip still causes trouble on the Brooklyn Bridge. Two accidents were caused one day last week by its failure to hold. One resulted in a collision and injury to some of the passengers. About all the trouble on the bridge railroad seems to be caused by the grip.

The Philadelphia *Ledger* says: "Philadelphia is to be the place of meeting in 1886 of the American Gas Light Association, and an effort is to be made to have a gas industries exhibition in connection therewith. It is quite likely that efforts will be made to have the Franklin Institute take hold of the matter.

The truck pay system, by which workmen are fleeced out of a percentage of their earnings, seems to maintain itself in spite of laws enacted to suppress it. Manufacturers that pay workmen in store orders and charge them high prices for everything supplied to them, are of very restricted benefit to a community. The citizens of Scottdale, Pa., seem to realize this fact. They subscribed liberally to establish a new pipe mill in that town, but required the company that will run the mill to give bonds to pay workmen entirely in cash. The "company store," therefore, will not be a feature of that establishment. The precaution of the people of Scottdale is a wise one and should be copied by other towns when extending aid to new enterprises. When a bonus is offered to bring a manufactory to a town the object is to benefit the local business of the place, but if the workmen therein employed have no money to spend, or next to none, the benefit is lost. By all means let it become a common requisite when extending local aid to manufactories that the workmen shall be paid wholly in cash.

LETTERS FROM PRACTICAL MEN.

Short Cut With Indicator Diagrams.

Editor American Machinist:

Noticing F. B. Rice's "Short Cut With Indicator Diagrams," in your issue No. 48, it occurs to me to suggest another short method.

Wishing to apply a permanent pantograph reducing motion to a 26″ engine, I made it to give a diagram of such length that with a No. 40 spring the area in square inches as given by planimeter has only to be multiplied by 80 to give the I. H. P. On a 23″ cylinder I subsequently arranged a similar apparatus so that the multiplier is 60.

W. S. SOUTHWORTH.

Cutter Bar for Slotter.

Editor American Machinist:

In your issue of Nov. 21st, there appears a cut and description of a relief cutter bar,

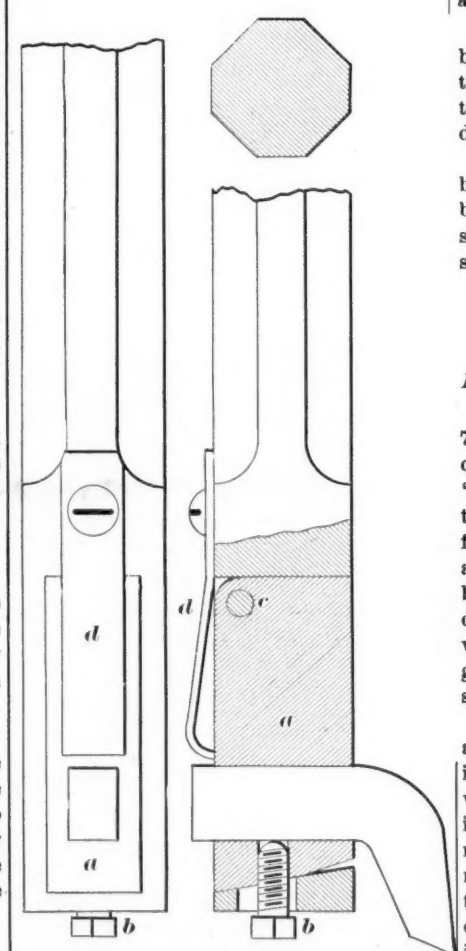


Fig. 1 *Fig. 2*

for a slotting machine, which leads me to think that the one illustrated by the sketch I enclose may be new to some of the readers of the AMERICAN MACHINIST.

Fig. 1 is a view of the back of the bar, and Fig. 2 is a side view, with the lower part in section. The upper part of the bar is forged octagonally, so that it may be turned one-eighth around in the holders to better facilitate marking in corners.

The lower part of the bar has a rectangular hole cut through, and the block *a* fitted to it, as shown, with a hole of proper form in the block, to receive the tools, which are held in place by the set screw *b*. The block *a* is held in place by the pin *c* which allows it to swing back, and thus relieve the tool of so heavy a drag during the up stroke, as soon as the tool has passed above, the mark block is returned to its proper position by the spring *d*. The lower end of the bar where the set screw passes through, is slotted so that the screw has room for all the swing necessary.

It will be seen that by the construction of this bar the pin and set-screw have little or none of the thrust of the tool to resist, and the tools can be changed instantly; by simply slacking the set-screw, the tool is free to be removed and another inserted.

B. E. PARKS.

Ferrysburg, Mich.

The Glass Ball Problem.

Editor American Machinist:

Mr. Richards' little example about the glass ball on page 6 of the AMERICAN MACHINIST, of November 28, is a good one. We like to get hold of them. They take the rust off our arithmetic, and sometimes they will even straighten "twisted arithmetic."

Such innocent looking little puzzles sometimes cover a trap, and if there is a trap in this one we are going to find it.

By arithmetic the 1″ ball contains .5236 cubic inches of glass, which we obtain by multiplying the cube of the diameter by 3.1416+.

As this glass is to be $\frac{1}{16}$″ thick, it will cover $16 \times .5236 = 8.3776$, which is approximately equal to the surface of the globe after it is blown.

To find diameter when area is given, we divide area by 3.1416, and extract square root of quotient. Therefore:

$$8.3776 \div 3.1416 = 2.634838,$$

and $\sqrt{2.634838} = 1.643''$ *Ans.*

Perhaps some of the boys* tried their algebra on it, and got left among cubic equations and hard-looking quadratics. No matter, work it out and see how nicely it can be done.

The correct diameter 1.695″ as computed by algebra, is $\frac{1}{20}''$ greater than as computed by arithmetic, owing to the convexity of the sphere requiring more surface whereon to spread a given quantity at a given thickness.

JAMES F. HOBART.

Something More About Levels.

Editor American Machinist:

In the AMERICAN MACHINIST, of November 7th, I read a communication under the head of "Letters from Practical Men," entitled "Something about Levels." The writer of that communication has no regard whatever for the usefulness of the tool, and his tirade against "levels with acorns on each end, brass levels, steel levels," etc., seems to indicate simply a prejudice against the tool, without making any serious argument, or giving us any conclusive reason why it should be "banished" from the workshop.

There is no doubt that this tool, as well as all others, when used by inexperienced help is abused, and put to uses for which it never was intended; but it has a limit in which, if used properly, it is a necessity in all well regulated machine shops. By that I do not mean where they play at shop. On reading the writer's article more closely I find but one instance in which he used a level where it was unnecessary, viz., on his planer centers. He makes a charge on its use at the drill, and says if the work is square with the spindle it needs no leveling. That may answer the purpose as regards small work when a square can easily be used, but when drilling large work with a radial drill, the work is generally rolled in position on cars or trucks, then the spindle or upright is tested, and the work leveled accordingly. This is by far the most expeditious way to obtain the desired object. In regard to planer work there are often pieces of such a pattern that a surface gauge or square cannot be used to an advantage, and your level can be applied to the platen, and, finding its condition, you can level the work to it. Then there are castings so large that they sometimes cover the platen, and it is impossible to square the work without a level. Now, in lining a stationary engine would

* To Mr. Richards' example given to machinists regarding the glass ball, we have received a number of replies. Among the other replies is one from H. Haberlin, Akron, Ohio, in which he gives as his result, 1 7-10 inch, and asks in return, of Mr. Richards, to what depth this ball would sink in water. "The Buckeye Machinist" answers 1.633″. W. Gribbin says 1.694″; and Charles Langlotz, 1.6951″+, as does, also, J. H. A., with the statement that this result is about the one-twenty thousandth of an inch too small.

the writer discard levels, and try something else?

I might keep on citing instances where the level is indispensable, but will only say that in the use of all tools judgment must be used also. TRY-SQUARE.

Foremen and Men.

Editor American Machinist:

As to the need of swearing at men and carrying a high hand generally, a great deal depends upon what sort of qualifications the foreman has. If swearing or swaggering is the best he can do, then, in doing this, he will acquit himself according to the best of his ability, and he cannot be expected to instruct men in morals, manners or workmanship.

The kind of men who will stay with such a foreman are those whose acquirements are in keeping with those of their foreman, and it is no wonder if their foreman does not care for their respect.

Such foremen and such men, happily, are not the rule in American machine shops.

OLD JOUR.

Sharpening Miners' Drills.

Editor American Machinist:

The engineer of San Jose, Mexico, who asks in your issue of November 28, to hear from some one having experience in tempering miners' rock drills, will find his drills to stand all right if he uses good steel and cuts off from $\frac{1}{2}''$ to 1″ each time the drill is repaired.

I have personally sharpened drills for a steam drilling machine, and noticed that a new drill made from a fresh bar of steel would stand admirably, but when I renewed it by hammering the edge sharp, it did not stand quite as well. The next time it was renewed by hammering it was still poorer, until finally, when thus renewed four or five times, it did not stand at all. Sharpening by filing did about the same.

I had noticed that at the Hoosac Tunnel, about an inch was cut off from the cutting end each time a drill was sharpened, and the whole work of forming the drill bit gone through with. I regarded this as extremely foolish at the time I observed it. A year later, when I came to repair rock drills, I said I would have no such fooling and wasting of steel and labor, and so did not cut off any at first. But I soon found that the Hoosac Tunnel practice was correct, for when my drills began to fail to do good service after being renewed several times, I studied the matter some, and thought I would try cutting off. As soon as I commenced this, my drills were all as good as if first formed on a fresh bar.

I then studied the matter more and soon came to the following conclusions:

1st. Each time a piece of tool steel is hardened it loses about one-tenth of its life and goodness.

2d. That the strength of the steel, as well as the wearing quality, are both injured about in the same proportion by repeated hardening.

3d. That a tool requiring repeated dressing and hardening, such as rock drills, cold chisels, lathe tools, etc., should be each time hardened for as short a portion of the length as possible, so that at any given time the steel at the point of such tool should have been hardened as few times as possible, and that in many cases it is advisable to cut away a portion of steel to bring the cutting edge down to the first hardening.

These facts should be kept in view by all tool-makers. A tap, for instance, which has been hardened and drawn a little too low, is about the same as ruined, because to try again by rehardening, etc., takes another tenth of the goodness of the steel away, and this cannot be spared from a tap, because at the best the tap is none too strong.

If the old Hoosac Tunnel drill department could be brought in to testify, it probably could give us a great deal of valuable information on how steel is affected by repeated hardening. S. W. ROBINSON.

Columbus, O., Nov. 19, 1885.

Device for Draining Locomotive Steam Pipes.

Editor American Machinist:

There is nothing so hard on valve faces and cylinder packing of locomotives as the condensed water formed in dry and steam pipes, especially if the throttle leaks, and engines have to make frequent stops. Port cocks are sometimes used to try and remedy the evil, but with us did not work satisfactorily.

The curvature of the steam pipes formed pockets below the level of steam chest, holding more or less water, according to the condition of throttle and length of stop made. When throttle was opened and engine started, water would be thrown over the engine to the great annoyance of engineer and fireman.

To remedy this, I put a 1″ pipe in the lowest part of steam pipe under the smoke box, on each side, and brought back, and connected them with a drum or cylinder made of 6″ gas pipes 14″ long, with plate on each end, and ground joint and bolt through center. This was secured above the truck 5″ or 6″ lower than steam pipes. As water formed, it drained into the drum. A cock on the lower side was attached to the cylinder cock rigging. This cock, being much larger than the cylinder cocks, was connected with a $\frac{3}{4}''$ pipe, which carried the water outside the frame near the back cylinder cock and was not noticeable. This device emptied the water before it went into the cylinder, and though very simple, has proved very effective. J. J. BINGLEY,

M. M. of H. J., H. & G. R. R.

The Georgia High-speed Engine.

The engine which we illustrate herewith is the invention of W. C. Wolfe, and is built by the Schofield Iron Works, of Macon, Ga. It is of the disk governor type, with continuous bed, designed to resist the strain and jar of high rotative speed and high steam pressure. The valve is balanced by a pressure plate and is under direct control of the governor for regulating the speed. Connected with the valve mechanism is an indicating device that shows at a glance the point at which steam is cut off. The lower guides are cast with the bed. Altogether the engine seems to be of solid and substantial construction and well made throughout. We are informed that one of them, 11×16, has been satisfactorily run at a speed of 500 revolutions.

A valued correspondent, who is himself connected with one of the leading concerns in New Haven, Conn., writes me that a new partner in one of the large manufacturing concerns there recently startled the office by sending out for the engineer, who came in and was asked:

"What did you stop the engine for?"

"Because my bearings were hot."

"Well, don't you ever do it again without asking permission from the office!"—*The Ironmonger.*

Testing Castings, or the "Unexpected" in Foundry Practice.

BY THOMAS D. WEST.

But few foundries or machine shops have been exempt from losses caused through "unexpected" failures in procuring good, sound and reliable castings. Were it possible to show in dollars the expense incurred throughout this country by "bad castings," the foundry would be looked upon financially as a mere "bucket shop."

As the purport of this article is simply to call the reader's attention to the importance of the above subject, only one case of a heavy loss in producing castings will be cited.

A few years back a prominent firm cast a number of large cannon, and before they were finished in the machine shop, some one accidentally let a light weight drop upon one of the cannons' trunnions, thereby knocking it off, and disclosing a weakness which condemned all the cannon then on hand. The cause of the trunnions being easily broken off was on account of a $\frac{1}{4}''$ riddle wire screen, which the moulder had nailed against the mould's face, to prevent dirt from flowing with the metal into the trunnions, when the mould was being poured. It was certainly a "bright idea," and one which would be productive of giving clean trunnions, and furthermore no one would think but that the heavy mass of hot liquid metal would in a few seconds melt or "eat up" all of the $\frac{1}{4}''$ riddle wire screen. Now it will surprise many to be told, that when the trunnions were knocked off, which was easily done, the fracture showed the $\frac{1}{4}''$ riddle wire, as perfect almost as when originally set against or in the mould. Such was set forth as a fact by one of our leading foundry men in conversation with the writer a few days ago, when discussing the question of things that unexpectedly happen in foundry practice.

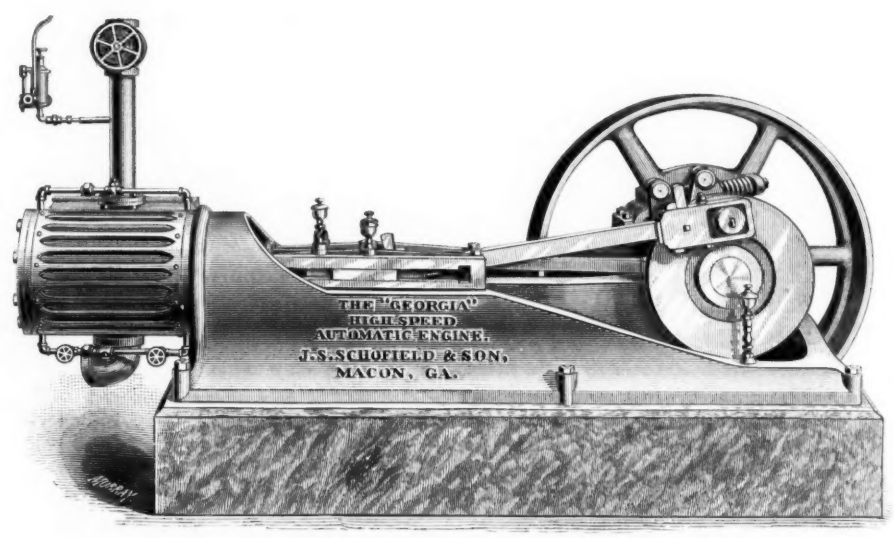
It will, of course, be evident to all, that had the ill union of the trunnions with the cannon been discovered when the first cannon was made, the great loss which was incurred could have been avoided. The moral the writer would have all draw from the above, is that of testing by finishing or otherwise the first casting made of important new work, and not wait until a large number are cast, a custom now by a great many followed.

There are a few firms which have been taught the advisability of the above through expensive experience, and those who have not will be some day, if they continue their present practice of allowing the accumulation of new work before testing it. The writer could cite many cases of heavy losses caused through the finding of some unexpected defect in accumulated new work, and such as make him susceptible to believing that new work or a change in the manipulating of old work, cannot be finally *warranted* as being perfect until proved by tests consistent with the nature of the work required of the castings.

With castings that require finishing, or in any way to be tested before they can be set up or utilized, the writer generally presses the testing of the first castings produced. In many cases he has felt himself ridiculed for making such a request, as the parties would say, "That casting looks splendid. What do you expect will be the trouble?" My answer would generally be, "I have nothing to specially expect; but it's what I don't expect I have fear of."

As the financial part of the burden incurred through the condemnation of castings generally has to be chiefly borne by the foundryman, some mercy should be shown him in making his burden as light as possible. When he desires his first casting *put to the test*, do not say, "Oh, I do not want to bother with them until they are all made." By granting his request you will not only be doing him a great favor, but you are liable to benefit yourself, for in putting the first casting to test you are just as liable to discover something which, while not sufficient to condemn the casting, would be desirable to have remedied, and of course if they are all made, you are obliged to accept them with all their slight objectionable defects.

The writer feels that all who have had a long and wide experience with foundry work will heartily join him in advocating the sense and spirit set forth in this article, and to all of limited experience there will come a time when they will learn that it's more the "unexpected" than the expected which is to be feared in the production and working of castings.



THE GEORGIA HIGH SPEED ENGINE.

"Patch it up so it will pass," said a young machinist, as he found a bad flaw in a coupling bolt. He patched it up. He patched up lots of other poor work, and poor material.

Finally he patched himself up to a rascal. He patched up old boilers, "so they would pass," and did lots of other dirty tricks.

Don't "patch a job" upon any pretence. No matter if boss, or owner "jaw" because the job is delayed by putting in honest work.

There are those who want honest work, from honest workmen, and the honest workman will get the best pay and the longest job if he only sticks to "no patching."

John J. Bingley, master mechanic of the Hanover Junction, Hanover and Gettysburg R. R., has resigned his position, after 20 years spent in the service, and C. G. Herman becomes his successor. Mr. Bingley has written several very interesting and practical articles for the AMERICAN MACHINIST on subjects connected with railroad work. Our readers will join us in hoping that he will find another field worthy his acceptance.

Equipment Must Precede Business.

The official in charge of a large railway corporation is reported as saying of one of its branch lines, whose equipment is admitted to be in very bad order, that the equipment is as good as the present business of the road warrants. Too many railroads are just now being run on the plan of making equipment wait for business. It is a peculiarity of railroad business, as of most other business, that before business can be done to advantage there must be something to do it with. Equipment and machinery can be purchased at the present time on such very reasonable terms, that there is very little excuse for taking refuge behind such a plea as the one referred to. So much has been and is being done by improved mechanical methods to make railroading profitable at rates that a few years ago would have been thought impracticable, and the business of the country along almost any line of railroad is capable of such continued growth, that it is hardly worth while to dwarf the business in advance by hide-bound ideas as to equipment and machinery.

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NEW YORK, DECEMBER 12, 1885.

CONTENTS.

	PAGE
Muncaster's New Shafting Lathe	1
Early Engineering Reminiscences. By George Escol Sellers, Eighteenth Paper	1, 2
Accidents Resulting from Faulty Practice	3
New Sheet Delivery for Two-Revolution Cylinder Printing Press	3
Mending and Putting on Belts. By Jas. F. Hobart	4
Modern Locomotive Construction. By J. G. A. Meyer	4, 5
The Frictional Resistance of Shafting in Engineering Establishments. By Samuel Webber.	5, 6
Letters from Practical Men—Short Cut with Indicator Diagrams—Cutter Bar for Slotter—The Glass Ball Problem—Something More About Levels—Foremen and Men—Sharpening Miners' Drills—Device for Draining Locomotive Steam Pipes	6, 7
The Georgia High-Speed Engine	7
Testing Castings, or the "Unexpected" in Foundry Practice. By Thomas D. West	7
Equipment Must Precede Business	7
Too Old to Learn	8
Selling Machinery on Installments	8
Is Hand Work Deteriorating?	8
A Postal Telegraph Wanted	8
Bartering Machinery for "Advertising"	8
Questions and Answers	9
Business Specials	9
Manufactures	9
Machinists' Supplies and Iron	10

Too Old to Learn.

Sometimes comparatively young men say they are too old to begin the study of some subject in which they may have an interest—too old to learn. This is not the case with men who have always kept up the habit of study. Men who have never suffered a lull in their efforts to learn something new, are never too old to learn, and to control and direct their energies in any direction to that end. The reason for this is plain enough. Learning is with them a habit which asserts itself as much as any other habit, and is intensified by time. There is never an occasion for especial effort in getting up to the *beginning* point.

Too many boys cease trying to learn when they leave school. If they go to a trade they expect some one to teach it to them. Their reading—if they read at all—is for amusement, not in the line of study. Such boys soon get too old to learn. If in later years they feel the necessity for study, they find it difficult to begin, and are apt to conclude they are too old.

Reading for no other purpose than amusement is likely to result in evil rather than good. Young men should begin the habit of reading and study with the definite object of learning something useful. If they do this, and keep it up, there is not the remotest danger that they will ever see the time when they are too old to learn.

Selling Machinery on Installments.

A custom is growing lately of selling certain kinds of machinery upon the installment plan, something after the manner very often followed of selling furniture. The buyer who has ready money to pay but half or a quarter of the cost of the machine is permitted to take it for use, after executing a chattel mortgage for the balance due. The furniture seller does not exact interest, but the machinery seller generally does, and the rate of ten per cent. is not uncommon. The buyer of installment machinery is not obligated to make regular weekly or monthly payments, but his part of the bargain is none the less easily executed. If business is dull the machine is likely to eat up the profits as fast as they can be made by its work. The installment plan of buying or selling is a good thing to avoid.

One of our exchanges, which is devoted to general storekeeping, is laboring hard to convince manufacturers and wholesalers that commercial travelers are an unnecessary expense, and that a merchant can keep up his trade just as well without them and save money. The idea is not a new one by any means. Many establishments have had it—and got over it. Every plan for selling goods that Yankee ingenuity could devise has been tried. Those methods have survived that have best stood the test of experience, and the commercial traveler represents one of them. He is numerous, and there will be more of him in the future.

We have a great many inquiries from stationary engineers as to what course to pursue to enable them to pass examination for a license, or to pass a competitive examination for a position as engineer. There is amongst many, young in the business, an impression that all that is necessary is to commit to memory certain questions that may be asked them. This is not and ought not to be true. Any list of questions, except so far as a knowledge of them shows general information on the subject, is worthless. It would be a very poor examination that gauged capacity to manage a steam plant by ability to answer certain questions, the answers to which a school-boy who never saw an engine or boiler could commit to memory even better than many skilled engineers. Young engineers should study whatever is connected with steam engineering, that will give them general information on the subject, and examinations should cover general rather than specific knowledge. A stationary engineer is likely to be called upon to meet some emergency and should have a clear idea how he will act at that time. But the conditions are not likely to be those that can be imagined, hence the reason why, under certain imaginary circumstances, he would do certain things, is much more important than a mere statement of what he will do. The reason, he will get from general information on the subject, and understanding that, he can apply it to anything likely to happen.

Is Hand Work Deteriorating?

A frequent correspondent of the AMERICAN MACHINIST, a skilled mechanic and engineer who does not believe that the extensive use of machinery has robbed the artisan of his skill, sends us as evidence a machinist's hand hammer forged by Fred Searle, a young man serving an apprenticeship at the blacksmith's trade with the Putnam Machine Company. It is very decidedly the finest hand forging of a ball-pene hammer, with the usual eight-sided nicks, we ever saw. There are no "low" spots, every corner is perfect, and the shape, to the eye, geometrically perfect. If it did not carry its own evidence that it was just as left by the hammer, the impression would be that it had been filed up a little more carefully than a machinist usually files his hammer, and then browned.

A Postal Telegraph Wanted.

An effort will be made in Congress this winter to pass some bill to erect or purchase a Government telegraph. There is unquestionably a popular demand for some measure of this kind, and the sooner a beginning is made the better it will be. Nobody supposes the Government will monopolize the telegraph business of the country by establishing postal telegraph lines. Private companies would not be driven out of business, as the amount of telegraphing increases largely every year. The wonderful success of a postal telegraph in Great Britain shows what a great benefit it would be to a country spreading out over such a great territory as the United States. The system, lately established, of sixpenny telegrams in Great Britain has already necessitated the employment of 2,800 persons and the expenditure of over $2,500,000. More than 850 miles of poles and 21,000 miles of wire have been put in position and submarine cables have been laid to the Channel Islands. The objections to a U. S. postal telegraph as presented by newspapers in that old fossil organization known as the "Associated Press," are that it would necessitate a large increase of Government employes, thus enlarging political patronage, and that the Government should not maintain opposition to private industries. If the first objection be sound, the reduction of letter postage to two cents was a bad change, as it so increased the postal business as to require a considerable increase of employes and the extension of postal facilities, by the starting of new offices, should be looked upon unfavorably. Many years ago, when our postal system was established, a great cry was made about its injury to private enterprise in taking away the business of the express companies. The present opposition to a postal telegraph system is based upon the same kind of argument, and the old newspaper editorials against a cheap rail route system would fit the "Associated Press" papers of to-day with but slight alterations. The people, however, demanded mail routes and cheap postage, which they secured. Now they want a Government postal telegraph, and the cliques and corners sustained by telegraph companies to the detriment of the public will sooner or later be swept away.

The report on the U. S. Navy-Yards to be submitted to Congress recommends the extension of some of the shops, and the purchase of considerable improved machinery to equip machine and boiler-shops. It would be wise economy to make a liberal appropriation for this purpose. If the navy-yards are expected to do work for anything near what private ship-yards will do the same, navy shops must be provided with just as good tools and machinery as the best private shops. There has been a great deal of talk about building new ironclads at some of the navy-yards. Before trying such an experiment, it would be best to provide shop equipments with which to compete favorably with outside establishments as to cost in making repairs.

Bartering Machinery for "Advertising."

A Western machinery dealer writes us regarding the practice in which some machinery manufacturers indulge, of giving advertisements to certain technical and trade publications to be paid for in machinery. As our correspondent suggests, the publishers of so-called "newspapers" who do business on the barter plan, in effect, acknowledge that their advertising space has no recognized or intrinsic cash. It should surprise no one to find that such publishers, not being regularly engaged in the business of dealing in machinery, naturally have no other method of getting rid of machinery obtained in this way than by cutting prices.

We have in mind an instance in which a certain publisher obtained water wheels of half a dozen different makes in exchange for advertising space, and publicly advertised them by name for sale at 25 per cent. below manufacturers' prices. We append our correspondent's remarks hereto:

Below we give you contents of a letter we have just written to a large manufacturing company who make wood-working machinery:

"We hardly think you have considered the results of trading machinery to other than legitimate dealers, and especially to a class of newspaper men, who do not appreciate the worth of anything that they trade their worthless advertising for, except the cash they realize out of it.

"We avoid, as far as possible, the advertisers, as well as the manufacturers who make such exchanges, and we believe that when you think of this matter seriously, you must come to the conclusion that we are right.

"*Good* advertising mediums *sell* their space, and do not need to barter it away, and it seems to us, that you can need no better proof of the worthlessness of the journals, or papers, which do a trading business, than the estimate that *they*, the publishers, place upon their space and services, or than the fact of their disposing of wares, machinery, etc., received by them, at *much less* than market prices, and in some cases, at even less than the cost of production, and, perhaps, for half what they allowed the manufacturer in account.

"Can you not see the bad effect of this practice upon legitimate trade?

"Rest assured that such exchanges are of the boomerang character, and must, if persisted in, result in disaster to those who pursue such pernicious practices."

We do not think the practice referred to is as general as our correspondent's letter above would seem to indicate, but so far as it does extend, its tendency cannot be other than hurtful to the interests of manufacturers whose product has a tangible market price, and can be sold accordingly. Legitimate newspapers have no interests which can be injured by the action of publications conducted on the truck and dicker plan.

The general business of the country does not always advance and recede with the ups and downs of Wall Street. Last year, when Wall Street had a panic, it did not upset general business, and the advance in Wall Street securities during the last few weeks has not had much effect on the aggregate trade of the country. Some railroad companies will benefit by the advance, and after selling a lot of securities, will be able to buy, and pay for, the supplies they need. This will help the machinery business to some extent. It will also stimulate the building of new roads and extensions, if the advance is maintained.

Since the use of natural gas in Pittsburgh and vicinity has become so extensive, a popular impression has obtained that thousands of men have been thrown out of employment in the mills of the city. The *National Labor Tribune*, however, says that

the use of gas has thrown out but an average of fifteen men in each mill, or six hundred in all. There are now 24,000 men employed in the iron and steel mills of that city. The change to natural gas fuel is felt severely among the coal miners.

Ladies are taking more interest in mechanical matters than they formerly did. They find the study of mechanics quite interesting and gather ideas in this field with readiness. We have heard of several who read the AMERICAN MACHINIST and therefore conclude there must be more. The presence of ladies is becoming quite a feature at the regular meetings of the American Society of Mechanical Engineers.

A machinery manufacturer wishes to know what (especially Southern) cities and towns, if any, still continue the effort to exact a special tax from commercial travelers desiring to sell them merchandise or machinery. Our information upon this subject leads us to believe that nearly every community in the country, which makes any pretensions to thrift or progress, so far from trying to fetter the traveling missionary, now prefers to use him as a valuable auxiliary.

Referring to the series of papers which are now being contributed to the AMERICAN MACHINIST by George Escol Sellers, entitled "Early Engineering Reminiscences," we are permitted to publish the following extracts from a private letter we have lately received from Coleman Sellers, of Philadelphia:

I am well pleased with what you have induced my brother to write, as, in a very little time, it will be impossible to recover the history of the early attempts at engineering in this country. I was about nine years old when the trial of the first engine sent out by Coleman Sellers & Sons, was made. I went with the party, quite the youngest of the crowd, and I remember every incident as related, not forgetting the dinner at the other end of the trip. The old inclined plane was then in use, and when the train reached the head of the plane, we had to wait until steam was raised to work the plane engines to carry the passenger cars down to the Schuylkill.

It is apparently the popular style of treating labor questions in the daily papers to charge trades unions with the causes of nearly all strikes, or, in other words, with the prevalence of strikes, be the same greater or less, in this country. The argument is that if trades unions could be crushed out, strikes would be few and less troublesome. It is worth while to observe where strikes prevail in Europe. Belgium is a country without organization among workmen. A trade union would be a curiosity in that little kingdom. Consul Robertson, at Liege, in a report to the State Department on the manufacture of firearms in Belgium, says: "On speaking to a manufacturer on the subject of strikes, he said it was *one continual strike*. In this industry the rate of wages is, or rather the earnings are, continually fluctuating, and are regulated by the law of supply and demand. The same workman, with the exception of the few finishers, assemblers, packers, &c., employed on the premises, rarely works for only one manufacturer, and often for several at one time. He changes his patron, too, whenever some other will give him a few cents more on a given job. The work is done by contract, and the manufacturer himself comes in contact with only a very limited number of the workmen who have contributed to the making of the goods which he sells." In direct contrast to this state of affairs is the method of regulating labor matters in the principal iron manufacturing section of this country. The workmen have their union and so have the manufacturers. The scale for labor is agreed upon every year, a committee from each union being chosen to make the arrangements. This settles the whole matter for a year. Petty disputes in any mill are quickly disposed of by committees specially provided for. As a strike must necessarily be large, it is seldom that one occurs.

QUESTIONS AND ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common-sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials, nor location will be published.

(338) E V. P., Dayton, Ohio, will find the subject of the pressure on slide valves discussed by Prof. S. W. Robinson in the AMERICAN MACHINIST of June 2, 1883. The same argument will, by analogy, apply to piston packing.

(339) Geo. A. A., ——, New Orleans, La., asks how far he shall set over the tail spindle of his lathe, in order to turn 3-16″ taper on 4″ of an 18″ piston-rod? *A.*—

$$4'' : 18'' :: \frac{3''}{16} \div 2 : \frac{27''}{64}$$

(340) N. P., East New York, asks: Can the United States inspectors grant a license to run stationary engines, and, if so, how should I go to work to get a license? *A.*—The United States inspectors do not grant licenses for stationary engineers You can get a license for Brooklyn by applying at the City Hall.

(341) A. L. V., Laceyville, Pa., writes: I have a 10″ x 15″ automatic engine which runs 200 revolutions. Two-thirds of the time I use only from 2 to 12 horse-power, but when sawing I need the whole power of the engine. How much coal could I save by arranging to run the engine 125 revolutions when doing light work? *A.*—Probably from 10 to 15 per cent.

(342) J. D. ——, Brooklyn, asks: I have a Niagara pump water cylinder 4″; steam, 8″. It is entirely too large for a steady feed. My boilers are 100 horse-power. If I reduce water cylinder by putting in a bushing, will it help? If not, what can I do otherwise? *A.*—Bushing the water cylinder would not be advisable. Better to run the pump slow. If it will not do this, it is out of order and should be overhauled, or a new pump put in its place.

(343) W. Z. B., West Mulford, Mass., writes: Will you please tell me of some quick way to space off the teeth in a rack for different pitches. In examining a rack of 16 pitch, I find about 5 to the inch; therefore, a screw cut 5 to the inch would space off a rack properly. How can I determine what thread to cut for 8, 10, 12, or any other pitch? *A.*—We do not know of any short cut except by patient setting off, except you make use of a dividing machine. You can find the thread, as you indicate, by dividing the given pitch by 3.1416. This would not be exactly correct, and, even if it were, would, in almost every instance, result in a fractional thread difficult to cut.

(344) C. S. G., Middletown, Vt., asks: 1. Would steel be a good material for a small engine 2½″x6″, and should it be hard or soft? *A.*—Nothing is equal to cast iron for the cylinder of a steam-engine You can use steel for the other parts soft enough to work easily. 2. What should be the thickness of cylinder for 100 lbs. pressure? *A.*—You cannot make it less than about ¼″ thick; this will be amply strong. 3. What should be the throw of the eccentric? *A.*—That will depend entirely upon how you arrange your ports. 4. What would be the power of such an engine at 120 revolutions, 100 lbs steam pressure? *A.*—About ¾ horse-power. 5. How large a boiler would be required? *A.*—Boiler with about 15 feet heating surface. 6. Which is best for boiler, iron or copper? *A.*—Iron. 7. What should be size of steam and exhaust pipe? *A.*—Steam pipe, ½″; exhaust pipe, ¾″, will do.

BUSINESS SPECIALS

Transient Advertisements 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

T. M. Parker, Steel Stamps, Stencils, Hart'f'd, Ct.

J. Clayton, Air Compressors, Rock Drills 43 Dey st, N Y

Edw. Sears, wood engraver, 48 Beekman st., N.Y.

Steel Name Stamps, &c. J.B. Roney, Lynn, Mass.

Tack, Wire, and Shoe Nail Machinery; Wm. A. Sweetser, Brockton, Mass.

Steel shank, wire nail, shoe nail and tack machinery. Keith & Trufant, Campello, Mass.

Tack and Wire Nail Machinery, made by the Willets Mfg. Co., Providence, R. I.

The Best Upright Hammers run by belt are made by W P. Duncan & Co., Bellefonte, Pa.

R. Dudgeon, 24 Columbia st, New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Pattern and Brand Letters. Vanderburgh, Wells & Co., cor. Fulton and Dutch sts, New York.

Patent attorney and expert. Machine designs and details. Wm. H. Weightman, 82 Astor House, N.Y.

Foot-Power Machinery for workshop use, sent on trial if desired. W. F. & Jno. Barnes, Rockford, Ill.

Lyman's Gear Chart. How to lay out gear teet Price, 50c. E. Lyman, C. E., New Haven, Conn.

Machines to form and bend steel and iron; run by power. Williams, White & Co., Moline, Ill.

"How to Keep Boilers Clean." A book mailed free, by James E. Hotchkiss, 86 John st., N. Y.

Improved Labor-Saving Upright Drills. 20 in. to 36 in. inclusive. Currier & Snyder, Worcester, Mass.

Selden Packing for stuffing box, with or without rubber core Randolph Brandt, 38 Cortlandt st., N.Y

Engine Lathes, Hand Lathes, and other fine tools, Assortment large: prices low. Frasse & Co., 62 Chatham st., N. Y.

E. Merritt & Co, Brockton, Mass., established 1859, only manufacturers of a complete line of Tack and Nail Machinery. Send for circulars.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocum & Son's Shafting Works, Drinker st., Philadelphia, Pa.

Files recut without drawing temper, about one-half usual prices; samples recut free; prices on application. The Acme Co, Collinsville, Conn.

Curtis Pressure Regulators, Curtis Return Trap, Curtis Damper Regulator. See Dec 5, p. 13. Send for circular No. 17, Curtis Reg. Co., Boston, Mass.

"Complete Practical Machinist," $2.50; "Mechanical Drawing Self-Taught;" $4. Books for workmen. Joshua Rose, Box 3306, New York City.

Screw oiler, for chairs or stools; pat. June 16, '85; will sell Western, Southern, and Pacific States; address L. Postawka & Co, Cambridgeport, Mass.

Kellam's Pressure Regulator—used in heating system of 11-story building, Madison ave., N. Y.,—saved, last season, $2,000 over previous season Hine & Robertson, 12 Cortlandt street, New York.

Locomotive Engine Running and Management. By Angus Sinclair. Gives full directions about handling and repairing locomotives; instructs how to design valve gear and set valves; Westinghouse air brake explained by aid of engravings. Price, $2. For sale by *National Car Builder*, 187 Dearborn st., Chicago, Ill.

Every young man who aspires to be either a mechanic, merchant, or manufacturer, owes it to himself that he become thoroughly familiar with the writings of Chordal. John Wiley & Sons, 15 Astor Place, N. Y., have issued a new and enlarged 12 mo edition of "Extracts from Chordal's Letters." Handsomely bound in cloth, with over 50 illustrations. Price, $2. Discount of 25 per cent. on orders for five or more copies

MANUFACTURES.

Water-works are to be built at Seville, Fla.

A new woolen mill is to be built at East Madison, Me.

Weekly payments are gaining favor in Lawrence, Mass.

M. G. Shaw & Sons, Bath, Me., will build a large planing mill.

The Pencoyd Iron Works, Philadelphia, Pa., are enlarging their works.

Henry Guenther, Owensboro, Ky, has added a foundry to his machine shop.

The Dunmore (Pa.) Iron and Steel Company—capital, $500,000—has been incorporated.

The Champion Card Company, East Pepperell, Mass., will build extensive works at that place.

The St. John Plow Company, with a capital of $20,000, has been organized at Kalamazoo, Mich.

Taylor & Crate, Buffalo, N. Y, have bought a saw-mill in Chattanooga, Tenn, and will enlarge it.

The Warwick Iron Company, Pottstown, Pa., will put their furnace in blast about December 10th.

It is expected that the Lamphear Machine Shop and Foundry, Phenix, R. I., will start up at an early day.

A four-story knitting mill is being constructed at Fourth and Somerset streets, Philadelphia, by Owen Osborne.

The Ellis & Lessig Steel and Iron Company, Pottstown, Pa., have 60 nail machines at work, and will soon add 20 more.

J. P. Miller, Laconia, N. H., is establishing a new hosiery mill for the manufacture of full-fashioned, all-wool, half hose.

The Mackinaw Lumber Company, of St. Ignace, Mich., will work up its mill refuse into pails, tubs and curtain rollers.

W. D. Wood & Co., Limited, Pittsburgh, Pa., will erect a large addition to their planished sheet-iron works at McKeesport.

The Bessemer Iron Mining Company, of Milwaukee, with a capital stock of half-a-million dollars, has been incorporated.

The Atchison Co operative Foundry and Stove Works, at Atchison, Kas., has been incorporated Capital stock, $100,000.

A building for the School of Design, to cost $100,000—architect, James W. McLaughlin—is to be erected at Cincinnati, O.

The Arcade Manufacturing Company, Freeport, Ill, recently incorporated with a capital of $12,000. will manufacture cork-pullers.

The Calumet and Hecla Mining Company, of Calumet, Mich., will probably erect a smelting works, beginning in the near future.

R. G. DeFoe, of Ohio, is in Birmingham, Ala., with a view to organizing a stock company to establish iron fence works in that city.

The bondholders of the Huntingdon Car and Car-Wheel Works have sold the plant at Huntingdon, to Percival Roberts, of Philadelphia

The Kitson Machine Company, Lowell, Mass., have nearly completed the extensive improvements which will about double their manufacturing capacity.

I. F. Dortch, Goldsboro, N. C., is chairman of a committee on water-works, which are to be constructed in that town. Bids will be received up to January 1st.

Hargrave & Son's match factory at Bay City, Mich., will be running about January 1. They will give employment to 100 men, and have a capacity of 160 cases a day.

W. C. Brown has taken charge, at 16 Dey street, New York, of a branch agency for the Phœnix Iron Works, Meadville, Pa., manufacturers of engines and boilers.

The Chattanooga Fence and Screw Company, Chattanooga, Tenn., have added $30,000 to their capital stock, and will make important additions and improvements.

The Tropical Construction Company has been organized at Tavares, Fla., by Alexander St. Clair-Abrams and others, to construct railroads, bridges, etc. Capital stock, $30,000.

F. W. Colston and J. W. Brown, Baltimore, Md., have bought the property and franchises of the Charlotte Water-Works Co., Charlotte, N. C., and will improve and enlarge them.

The Bridesburg Manufacturing Company, Philadelphia, has received an order from Chester, Pa., for $25,000 worth of worsted goods machinery for a new factory which is being established there.

The Virginia Iron and Steel Company's plant and works at Buffalo Gap, Virginia, has changed hands and passed into the possession of New York and Philadelphia parties, who will put them in full blast at once.

Hoyle, Harrison & Kaye have begun the erection of a group of manufactory buildings at the northwest corner of Lehigh avenue and Third street, Philadelphia. The main building will be a yarn manufactory.

It was said last week that the sale of John L. Colby's iron works at Lanesboro, Mass., had been closed with English parties in London, and that they proposed to put up a large establishment for the manufacture of car-wheels.

J. D. McNeely's scheme for the erection of a cotton factory at Salisbury, N. C., in which farmers generally are to have shares, is progressing most favorably. Land for the site has been tendered him as a gift.—*Cotton, Wool and Iron.*

Beebe & Webber, the South Holyoke (Mass.) woolen manufacturers, will soon build an important addition to their mill, the excavating for which has already begun. The building will be 175 feet long, 36 feet wide and two stories high.

The Bartlett Hardware Company and the Spring Hinge Company have consolidated their spring-hinge departments, and erected shops at Freeport, Ill. Capital stock, $75,000. D. A. Knowlton and Levi M. Devoe are the parties interested.

The Paterson Locomotive Works, Paterson, New Jersey, have received an order for 24 new locomotives for the Minneapolis and St. Louis road, and the Cooke Locomotive Works, in the same place, are filling an order for 24 locomotives for the Minnesota and Northwestern road.

The Eaton, Cole and Burnham Company, 82 Fulton street, New York, manufacturers of pipe tools, pipe, valves, fittings, brass goods, etc., inform us that in volume their business is better at the present time than it has ever been before, the only ground for complaint being that prices are still low.

William J. Finley, the largest individual brewer in Ohio, has decided to incorporate his business under a capital stock of $800,000, one-half of which he will give to his hundred or more employes. He is one of the wealthiest residents of Toledo, and proposes to help the men who helped him earn his wealth.

The new factory building of the Crane Brothers Manufacturing Company, Chicago, will be ready for occupation in about two weeks. It is to be used exclusively for elevator building, and will be fitted with new machinery and employ about 200 men. The old machine shop is to be divided up and used for the manufacture of wrought-iron goods.

Projected hardware companies: Safety Nut Lock Company, Chicago, $200,000 capital, by Jas. E. Davis and others; Stark Nut Lock Company, St. Louis, Mo., $100,000 capital, by F. C. Stark and others; A. W. Cox Cutlery Manufacturing Company, Newark, N. J., $125,000 capital; Arcade Manufacturing Company, Freeport, Ill., $12,000 capital, hardware specialties.—*Tinner and House Furnisher.*

The Georgia Fence Company, Atlanta, Ga., have a very ingenious, though illy-designed, machine for making a continuous picket fence. Pickets are fed into the side of the machine, and six strands of wire are fed from separate reels into the end. The machine twists two strands of wire around each end of each picket, and two around the middle. Any desired number of feet of fencing may then be run off continuously, and rolled up ready for shipment.

The new and extensive steel works of the Pottstown Iron Company, west of Pottstown, Pa., in course of erection, will, it is believed, be ready to put in operation in February next. They will, from the start, employ about 300 men. The large iron works of the same company, east of the town, are in successful operation, business being quite prosperous in the nail mills. Preparations are being made to put the furnace of the company in blast, it having been idle some time.

A. E. Cartier, Ludington, Mich., will build a new shingle mill this winter.

Boiler and iron works will be erected at Youngstown, O., by Beatty & Klipp.

The Bellaire Nail Works, Bellaire, O., will largely increase their capacity.

Johnson & Clough, Brownville, Me., will start a manufactory of hose reels.

A large addition to their brewery will be made by Bowler Bros., Worcester, Mass.

Wire works are to be built at Rochester, Pa., by Armstrong Bros. & Co. and other parties.

W. E. & J. T. Skillings, Bethel, Me., are putting in machinery to manufacture spool lumber.

The foundry of F. S. Thomas & Co., Pittsburgh, Pa., destroyed by fire, is to be rebuilt at once.

F. I. Gerhard will erect a two-story brick factory building at 112 Belmont avenue, Newark, N. J.

A four-story brick factory building will be erected on Swanson street, near Catherine, Philadelphin, by Brownfield & Co. The contractor is Lewis Havens, 113 N. Fifth street.

Moseley & Co., Elgin, Ill., send us their new pamphlet catalogue of watchmakers' tools, which will also be of interest to shops doing small work of other kinds.

The Missouri Pacific Railroad Company proposes to erect a foundry and car shops near Atchison, Kans. The cost will amount to $250,000, and they will, it is claimed, be the finest car shops on the road.

Machinists' Supplies and Iron.

NEW YORK, Nov. 25, 1885.

Matters have now reached the stage at which some tendency toward speculative purchases is talked of, indicating expectation of higher prices. Pig iron, steel rails, tin and copper are feeling this tendency. Prices are mostly firm.

Iron—In American pig, business has been of fair volume, comprising purchases of small consumers, who usually buy for current use, while the offerings continue moderate. The furnace companies supply regular customers at previous prices, but dealers ask higher prices. There is talk of speculative purchases. Quotations are: No. 1 X Foundry, $18 to $18.50; No. 2 X Foundry, $16 to 17; Grey Forge, $14.50 to $15.50.

Scotch Pig—Values firm, but not quotably higher. We quote Coltness, $19.50 to $20; Glengarnock, $18 50 to $19 to arrive; Gartsherrie, $19 to $19.50; Summerlee, $19 to $19.50; Eglinton, $17.50 to $18; Langloan, $19.50; Dalmellington, $18 to $18.25.

Lead—Quiet and firm; demand moderate, at prices ranging from $4 20 to $4.25 and $4 30 for Western.

Copper—Quiet and steady. Lake held 11⅛c. to 11¼c. Transactions light.

Tin—Market easier; demand light. Jobbing lots Banca quoted 21c.; Straits and Malacca, 21¼c. cash.

Spelter—Quiet and steady. Refined, 5¾c. to 6c.

Antimony—Hallett's, 8½c.; Cookson's, 9½c.

WANTED

"Situation and Help" Advertisements, 30 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

Situation as foreman of machine shop; good references given. Address Buckeye, AM. MACHINIST.

Wanted—A young man who is a first-class draftsman. Apply 93 Washington st., N. Y.

Situation as foreman or supt. of machine shop; good references. Address R., AM. MACHINIST.

Situation as a practical wrench foreman. Address, P. O. Box 779, Southington, Conn.

Wanted—Work in small machine shop, with chance to take part interest at future time. Address, K. M., Boston, Mass.

Position wanted as draftsman; is practical machinist, and capable of designing. Address, Box 277, AM. MACHINIST.

Wanted—By young man, position as timekeeper, bookkeeper, or shipping clerk, in manufacturing concern. Address, N. B. E., AM. MACHINIST.

Wanted—By practical mechanic, designer and draftsman, position as supt. or foreman of machine works; have had large experience handling men and systematizing work; best reference given; corresp'ce solicited. Address Box 486, Waterbury, Ct.

Wanted—Situation as foreman boilermaker, by a practical boilermaker, 39 years of age; 25 years' experience; 9 years as foreman, locomotive boilers, tanks, tubular boilers, flue boilers, etc.; knows how to take care of tools, and work them and men to their full capacity; best refs. Address P. B., AM. MACHINIST.

MISCELLANEOUS WANTS

Advertisements will be inserted under this head at 35 cents per line, each insertion.

The Crescent Steel Tube Scraper is king. Crescent Mfg. Co., Cleveland, Ohio.

Wanted—Patented articles to manufacture and introduce. Box 88, Newark, N. J.

To make room for larger tool, will sell cheap, for cash, a planer 42"x42"x12', in good order. Address, P. O. Box 2085, Bridgeport, Conn.

Special mch's. for any kind of mfg. designed to order. Also plain and autom'c eng's. Send for circular and refs. Weston & Smith, Syracuse, N. Y.

CHANDLER & FARQUHAR,
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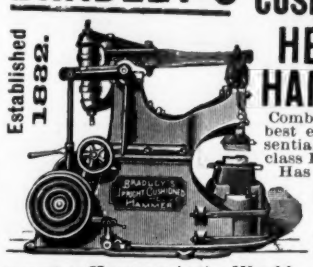
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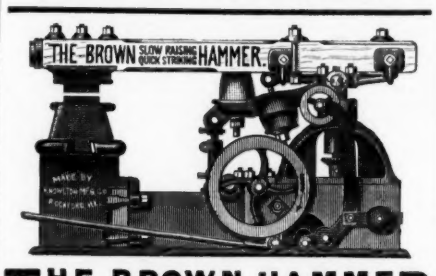

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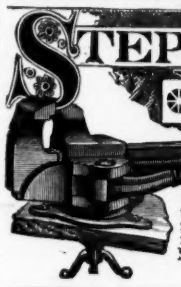
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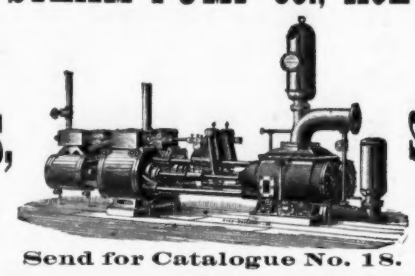
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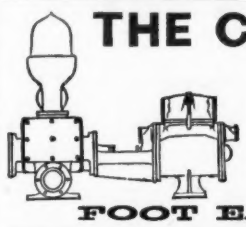
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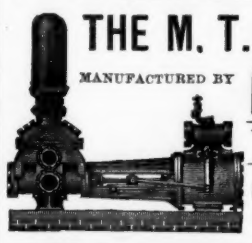
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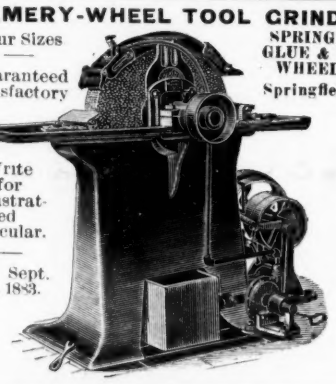
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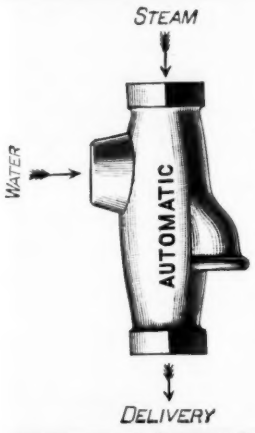

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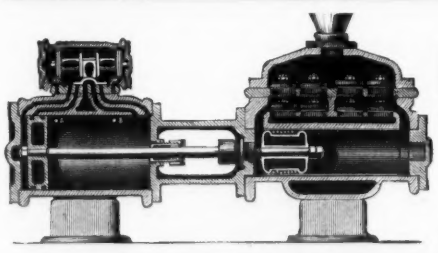

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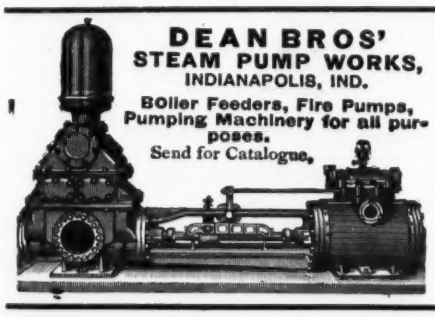

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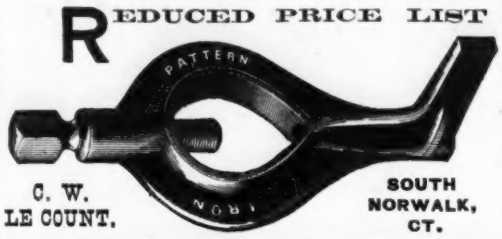

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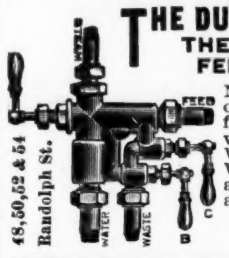

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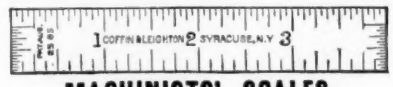

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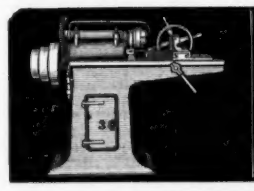

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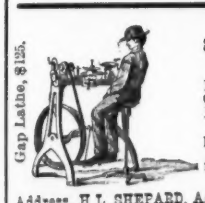

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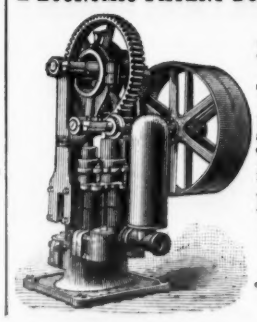

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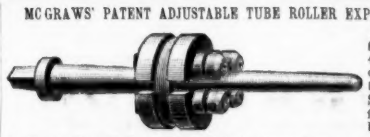

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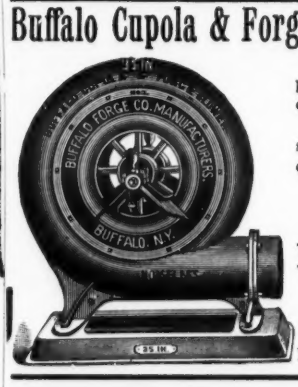

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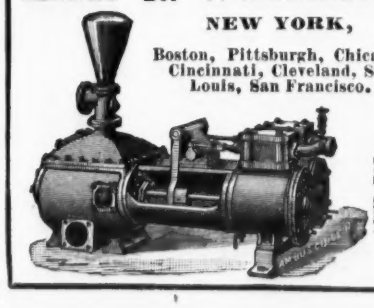

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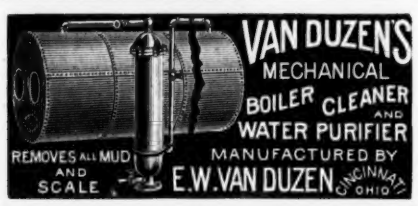

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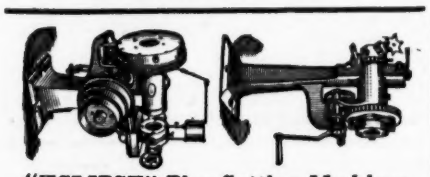

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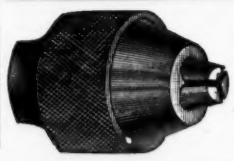

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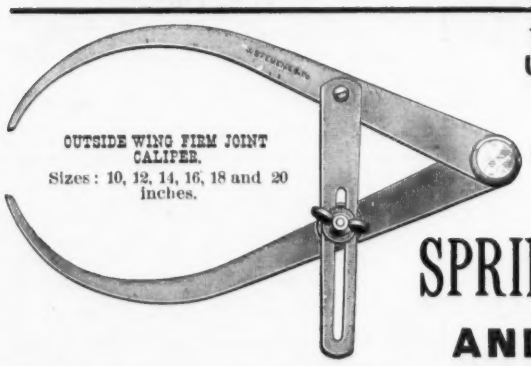

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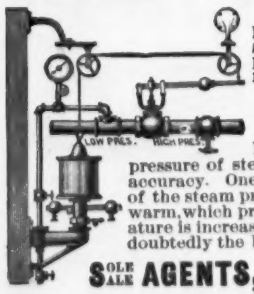

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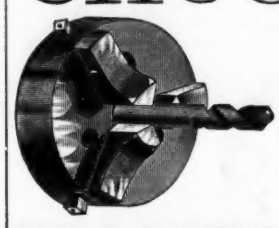

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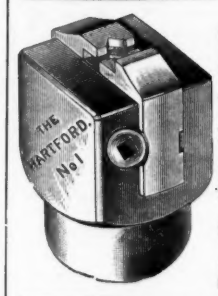

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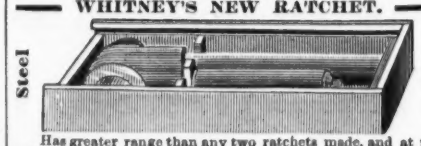

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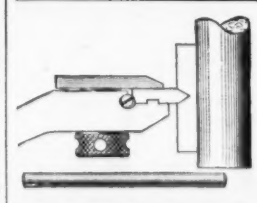

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NOTICE.

Week before last we published, under this heading, references to a small portion of the practical articles that have been specially prepared for the AMERICAN MACHINIST, and have appeared in our columns during the last few months. Last week we published an additional list. We append another list below. No other mechanical journal in this country has or ever has had such a collection of practical articles, by writers of well known ability, as are presented in these columns week by week. Every issue gives information that is taken up and applied in the shops and factories in various parts of the country. Copies containing these articles can be readily obtained by ordering of any newsdealer, or by writing to this office, at 5 cents per copy.

J. C. Hoadley.

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Diagram Showing the Inertia of the Reciprocating Parts of the Steam Engine. June 7, 1884
Inertia of the Reciprocating Parts of the Steam Engine. June 7, 1884; September 13, 1884

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Draft Regulating Appliances. March 15, 29; April 12, 26, 1884
Fitting Locomotive Wedges. August 16 1884
Driving Boxes and Wedges. September 27, 1884
Building Locomotives in Repair Shops. February 9, 1884
Locomotive Draft Appliances. April 25, 1885.

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Cutting Down the Face of Gear Wheels in the Mould. October 25, 1884
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Melting Steel in an Ordinary Cupola. August 23, 1884.
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Economy in Using Small Cupolas. May 16, 1885.
Steel Castings. Aug. 15, 1885.
Casting Steel in an Ordinary Cupola and Publishing the Process. July 25, 1885.

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Doing Jobs on Sunday May 30, 1885
Examination of Stationary Engineers. August 22, 1885
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Against Sunday Work. July 18, 1885

Angus Sinclair.

Chicago Limited Express. January 5, 1884
Fuel Economy with Locomotives. July 5, 1884
Locomotive Engine Running. February 9, 23; March 8, 22; April 5, 19; May 3, 17; June 7; August 16; November 1, 1884
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Railroad Snow Plowing. January 19, 1884
How the Fastest Train in America is Run, January 5, 1884
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Water for Locomotive Boilers. September 20, 27, 1884.
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The Perfect Screw Problem. July 19, August 3, 1884
Proportioning Slide Valves and Determining the Effect of Different Proportions. August 16, August 30; September 6, 27; October 4, 11, 1884

A. J. Stevens, Gen. M. M., C. P. R. R.

Performance of a Locomotive. February 2, 1884
Correction of Boiler Criticism. January 3, 1885
Indicator Diagrams from the Largest Locomotive in the World. January 10, 1885
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Deep Well Pump on the C. P. R. R. June 27, 1885

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The Bursting Strain in Revolving Wheels. February 16, 23, 1884
What Is Centrifugal Force? April 12, 1884

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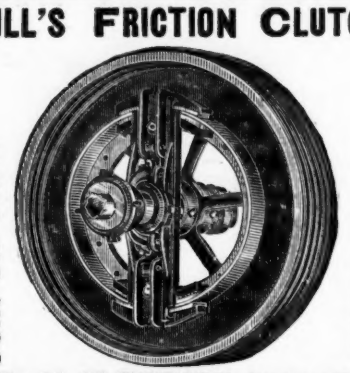

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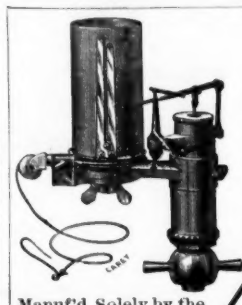

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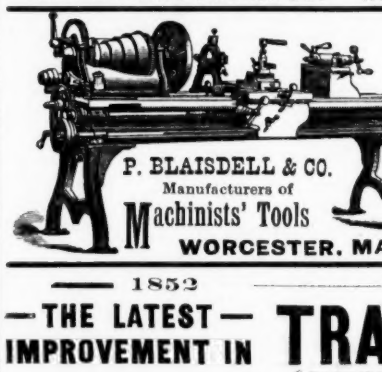

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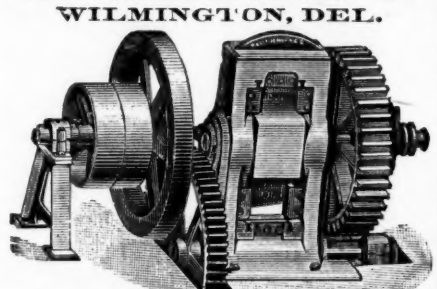

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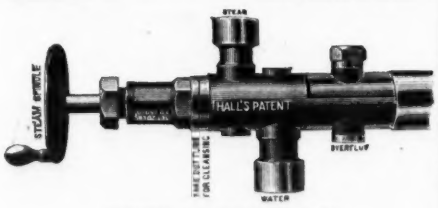

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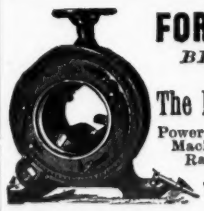

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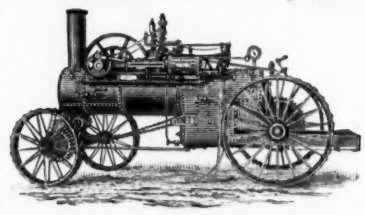

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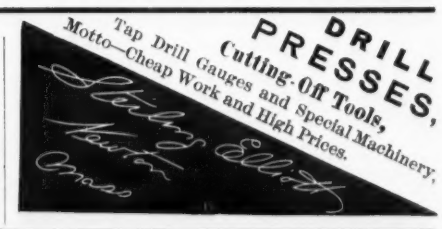

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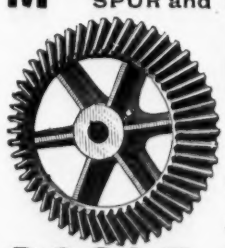

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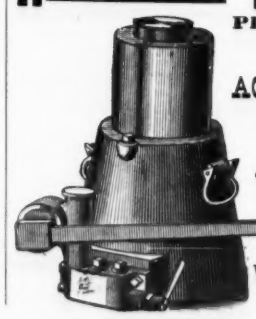

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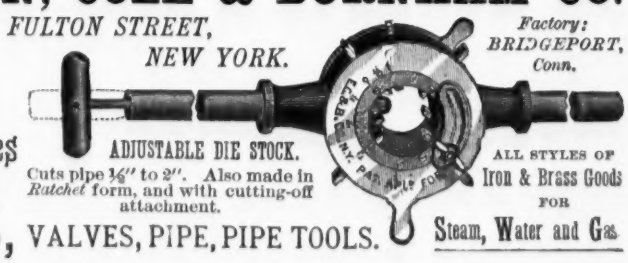

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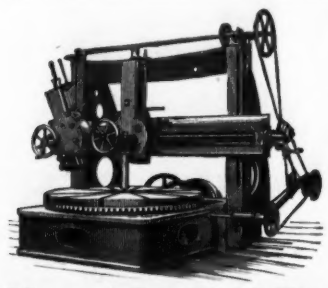

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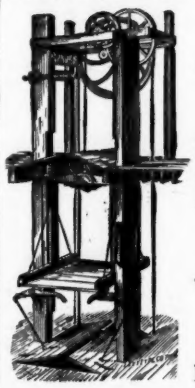

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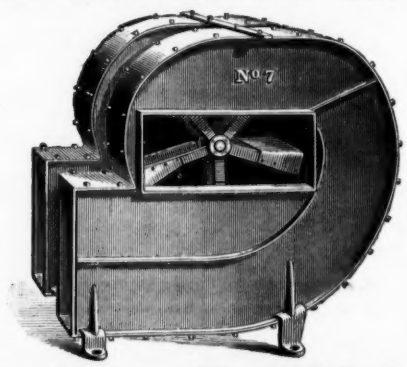

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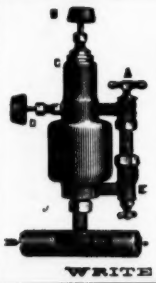

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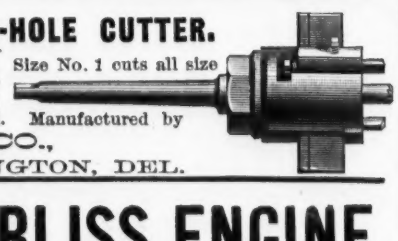

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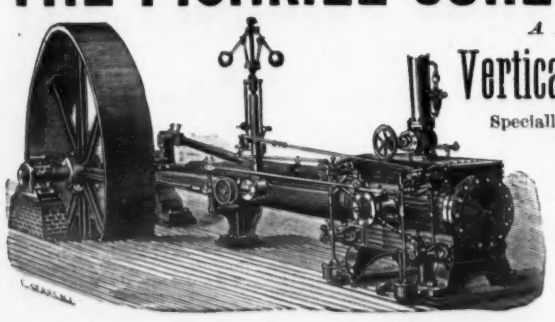

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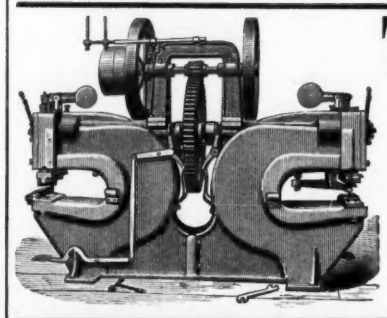

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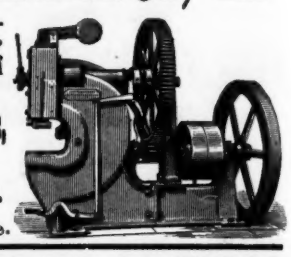

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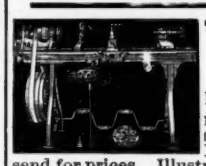

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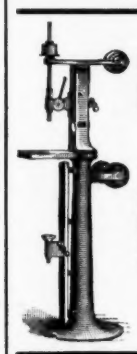

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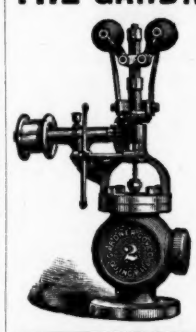

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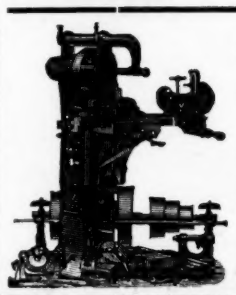

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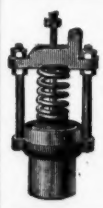

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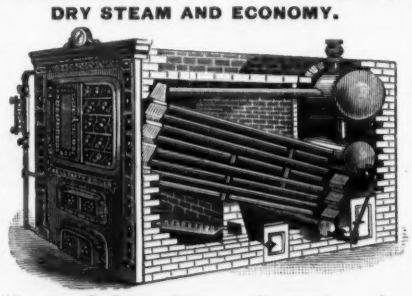

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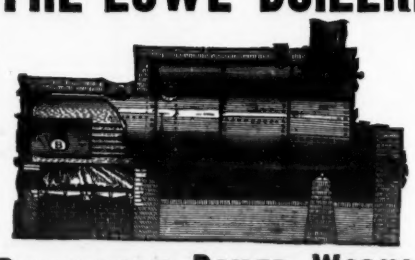

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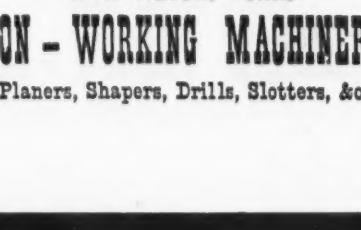

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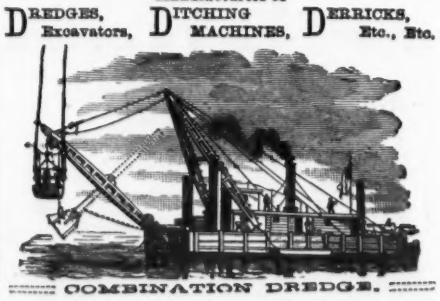

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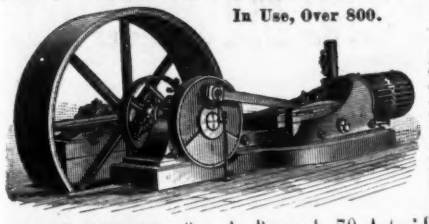

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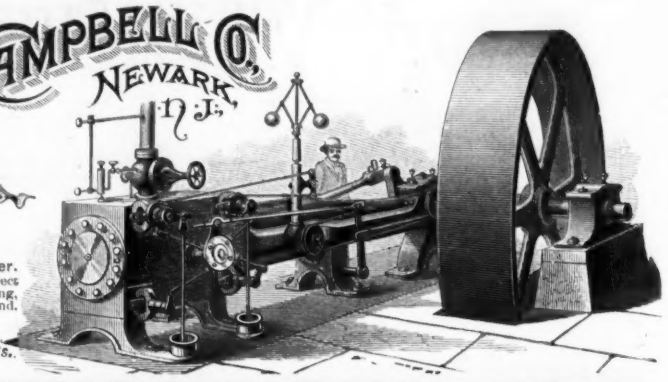

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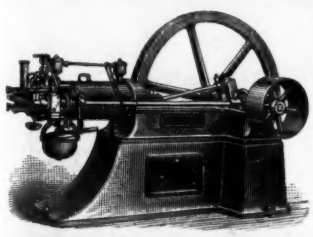

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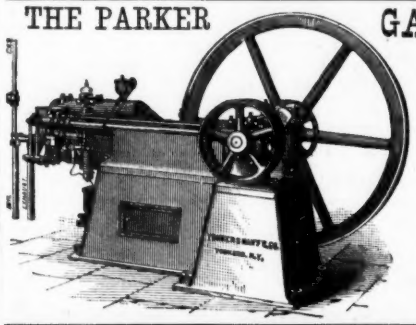

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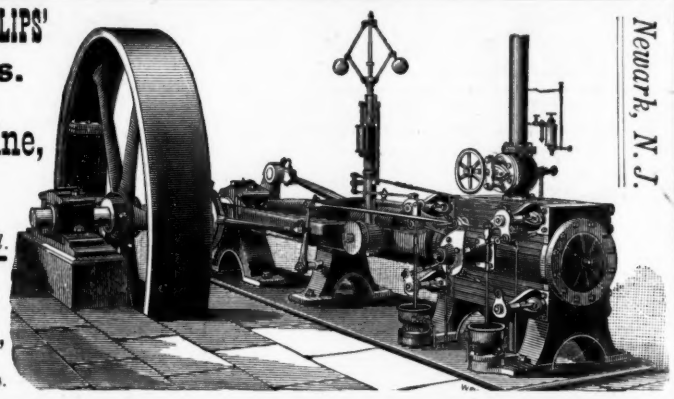

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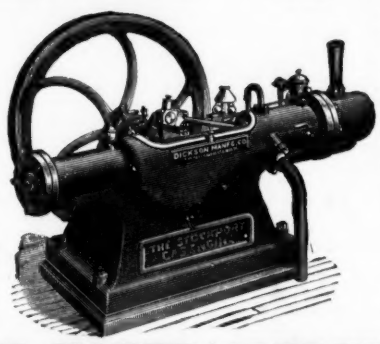

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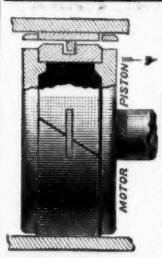

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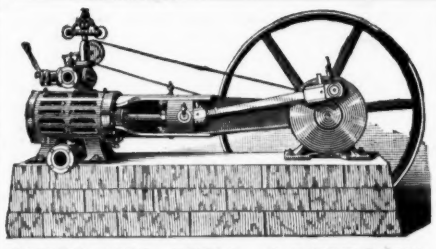

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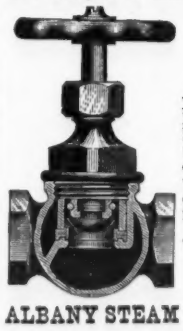

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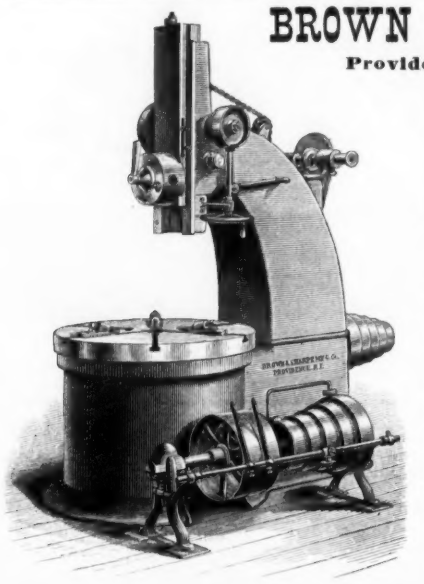

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Patent August 4th, 1885.

With this Machine, from two to four times as much work can be accomplished in a given time as can be done upon an Engine Lathe, and in a much superior manner, the work being more easily trued and fastened in place than upon any machine having a horizontal spindle, and the different tools in the turret-head easily brought into operation in succession, while from the perpendicular position of the same, the chips fall through the center of spindle of revolving table to the floor, causing no trouble by clogging of reamers, &c.

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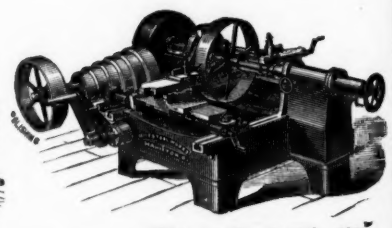

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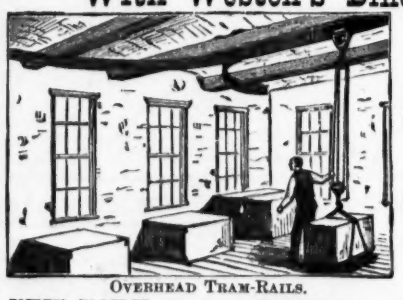

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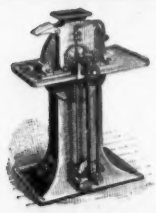

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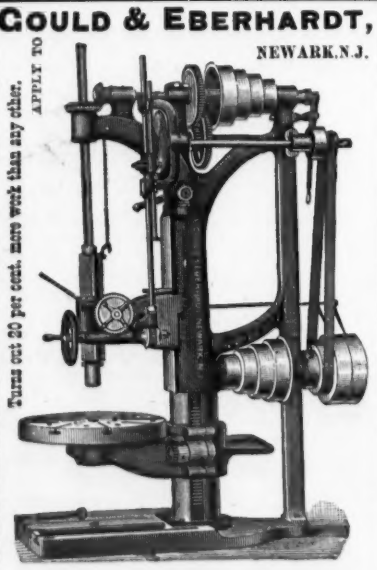

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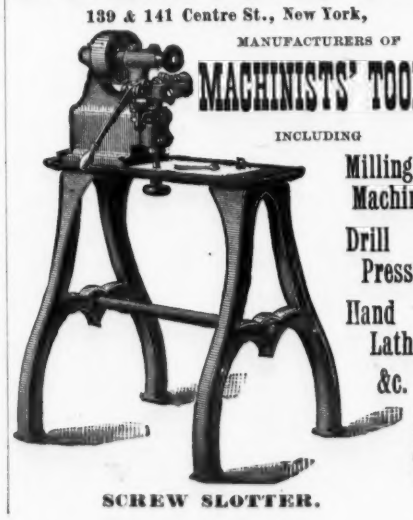

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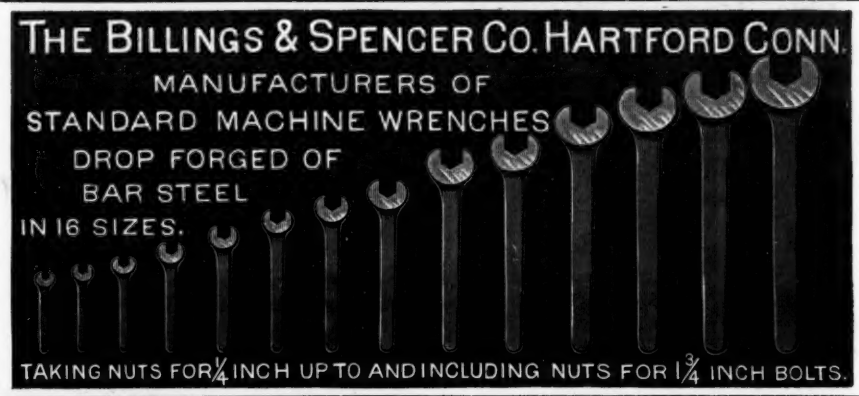

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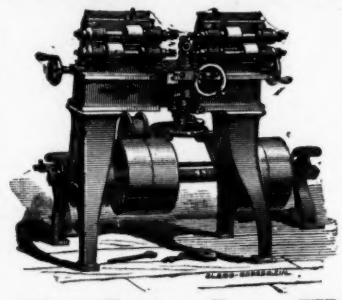

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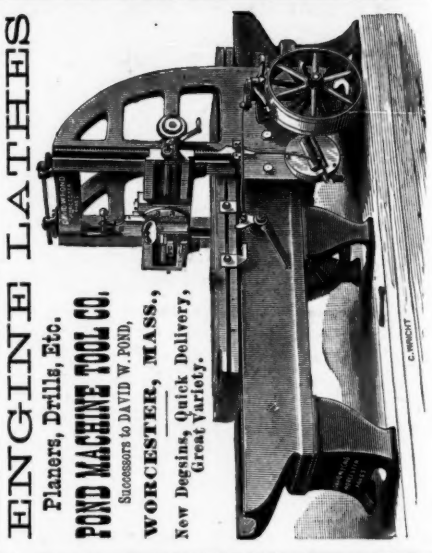

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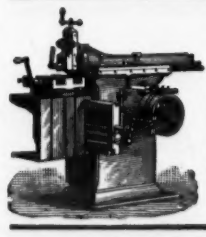

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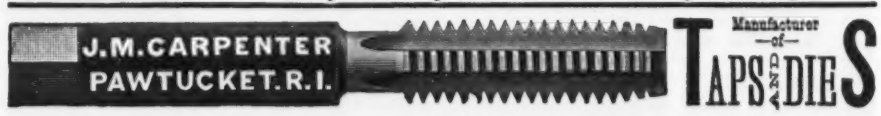

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